THE ENGINEERING AND MINING JOURNAL

Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXVI. No. 15.

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SUBSCRIPTION PRICE, including postage, for the United States and Canada, $4 per annum ; $2.25 for six months ; all other countries, including postage, $5.00 = 20s. = 25 francs = 20 marks. All payments must be made in advance.

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THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager,

P.O. Box 1833. 27 Park Place, New York.

CONTENTS

EDITORIALS : PAGE.

The Titles to Canadian Phosphate Lands ... 225
The Waste of Anthracite Coal ... 225

CORRESPONDENCE :

Mr. Alfred R. West and the Guanacevi Mining Company ... 226

The Troy Meeting of the American Institute of Mining Engineers ... 226
Asbestos and its Applications ... 228
The Present Condition of the Mines of the Tombstone Mill and Mining Company ... 229
The Sources of Loss in the Combustion of Fuel ... 230
The Gaskill Pumping-Engine at Saratoga, N. Y. ... 231
Diamond Mining in the Province of Minas-Geraes, Brazil.—II ... 233
The Strength of Wrought-Iron Struts ... 233
Furnace, Mill, and Factory ... 234
Mineral Patents Granted by the United States Land-Office ... 234

NOTES : PAGE.

Fuel-Gas Company ... 230
The Check-Weighman Law ... 230

GENERAL MINING NEWS :

Arizona ... 234
California ... 234
Canada ... 235
Colorado ... 235
Dakota ... 235
Georgia ... 235
Mexico ... 235
Michigan ... 235
Montana ... 236
Nevada ... 236
New Mexico ... 236
Ohio ... 236
Utah ... 236

FINANCIAL :

Gold and Silver Stocks ... 237
Copper Stocks ... 238
BULLION MARKET ... 238
METALS ... 238
IRON MARKET REVIEW ... 240
COAL TRADE REVIEW ... 240
Advertisers' Index ... xii

THOSE who have invested capital in the phosphate lands of the Province of Ontario are considerably alarmed at a recent decision in the Quebec courts. The local legislature had passed an act canceling the title to certain crown lands, on the ground that the necessary settler's improvements had not been made, and had sold them as phosphate lands. This act has now been set aside by the courts, and, should their decision be sustained on appeal by higher courts, the titles under which many phosphate mines are worked by American capital would be destroyed.

THE WASTE OF ANTHRACITE COAL.

Mr. CHARLES A. ASHBURNER, geologist in charge of the anthracite district of the Pennsylvania Survey, has recently read before the Engineers' Club of Philadelphia an interesting paper on the estimation of the contents of highly plicated coal-beds, to which Mr. ARTHUR WINSLOW, one of his assistants, has contributed a mathematical discussion of the errors involved in the method employed. Mr. ASHBURNER states this method (which is the one proposed by him two years ago, in a paper before the Institute of Mining Engineers) substantially as follows : The contour-survey of the coal-bed having been made, it is desired to obtain the actual area, that is, the area which would result if the surface were developed or ironed out into a horizontal plane. This area, multiplied by the thickness, would give the cubic contents of the bed. To obtain the bed-area, by a graphic method, vertical cross-sections of the contoured bed are constructed perpendicular to the general direction of the coal-basins, and at equal distances apart. The restored position of the bed is constructed where the coal has been eroded. Each of these individual section-lines is developed into a straight line, which represents the distance, "up hill and down hill," along that section, across the basin from outcrop to outcrop. The development of the section is made on each side of its intersection with a vertical plane, arbitrarily located, but preferably near the axis of the basin. The ends of the developed section-lines are then connected by a broken line, which thus incloses approximately the area sought, namely, the total area, "up hill and down," of the basin, including the regular dips, the overturned dips, and the portions removed by erosion.

We do not need Mr. WINSLOW'S calculations to convince us that this method is sufficiently accurate, where the sections are not too far apart, and great irregularities do not occur between them. Mr. ASHBURNER has settled upon 1600 feet as the distance between his parallel sections ; and by a test-survey of the eastern end of the Panther Creek basin, he finds that, by putting the sections 800 feet apart, the developed area obtained was 0·344 per cent less than with 1600 feet interval. From this, he concludes that the probable error by the use of 1600-foot intervals is 0·688 per cent. To this should be added the error due to the method of development, which Mr. WINSLOW discusses for spherical and conical contours and for wedge-shaped troughs. In the latter class, he places the Panther Creek basin, and determines the error at 0·217 per cent (deficiency). Added to the error for sectional intervals, this gives a total error in area of 0·905, or say 1 per cent. Considering that the area thus obtained has to be multiplied by the average thickness of the bed, and allowances have to be made for eroded coal, and for crushed and dirty coal, we are quite ready to say that this one element of a calculation in which the other elements are largelye stimated, is thus determined with almost unnecessary accuracy.

But the question suggests itself, whether this elaborate graphic method is required. Why could not the *horizontal* or cadastral area be simply multiplied into the *vertical* thickness? This eliminates at once the errors which Mr. WINSLOW has discussed with the aid of the calculus ; and the sources of error which it substitutes are probably less serious. Indeed, they are present to some extent in Mr. ASHBURNER'S method. For, after he has determined his "developed area," he must still obtain from columnar sections an average thickness by which to multiply it ; and it is quite as easy to get the average vertical thickness as the average thickness perpendicular to the roof and floor. In fact, the latter must often, in each single measurement, be determined from the former. In the case of a bed of uniform thickness with frequent changes of dip, it might be easier to ascertain the "developed area," and multiply by the uniform thickness, than to take the cadastral area and try to determine an average vertical thickness from a sufficient number of measurements of a vertical thickness constantly varying with the dip. But such a case scarcely ever arises in practice ; for in practice plicated beds vary in thickness anyhow. The only other difficulty in the simpler method we suggest is that, where dips are overturned, this method would take no account of the duplication of the bed within a given area. But as Mr. ASHBURNER, employing a method which laboriously includes these overturned dips, would have to subtract them afterward, because they almost invariably contain crushed and worthless coal, this objection visibly dwindles, if it does not disappear.

We are not certain, however, that this method would be for all cases the most convenient ; and we will not quarrel with Mr. ASHBURNER about his preference. His forthcoming volume will doubtless give in detail the calculations of special cases. We shall welcome that volume as a valuable contribution to the literature of the important question of waste in mining anthracite ; and meanwhile, we are glad to give, through Mr. ASHBURNER'S courtesy, the figures he has obtained for the property of the Lehigh Coal and Navigation Company, in the Panther Creek Valley, between Mauch Chunk and Tamaqua. By careful work, he arrives at the following result :

	Tons.
1. Amount of coal originally contained in the basin	1,032,997,131
2. Original amount in the exploited area	92,188,922
3. Amount taken out (to January 1st, 1883)	54,115,834
4. Which has produced in marketable fuel	24,817,361
5. Estimated amount still accessible in old workings within the exploited area	10,000,000
6. Which will produce in marketable fuel	3,400,000

The difference between No. 2 and No. 3 represents the amount left underground by wasteful methods of working, and No. 5 may be taken as representing a portion of that loss which better economy and better engineering can still recover. Mr. ASHBURNER has had the advantage of a careful record, kept for two years, of the distribution of every pound of

coal which came from the mines; and combining this with the general data above summarized (the details of which for each separate colliery will appear in his volume), he reaches the following conclusions for the mining industry of the Panther Creek Valley:

	Percentage left in mine.	Percentage sent to culm-bank.	Percentage converted into fuel
From 1820 to Jan. 1st, 1883.....	41	32	27
For 2 years, from Jan. 1st, 1881, to Jan. 1st, 1883..	30	24	46

These conclusions differ widely from the statements of some of our best anthracite engineers; and the unusual care with which they have been obtained will attract to them much interest. The improvement indicated by the final figures is highly creditable to the management of the Lehigh Coal and Navigation Company. It indicates great progress, both in the mining and in the preparation of coal—principally, we think, in the latter. That is to say, improved breaker machinery and jigs for washing coal have permitted a good deal of coal to be mined which was formerly left underground as too dirty for preparation, while at the same time, they have permitted the preparation of clean small sizes, formerly thrown away with the dirt, but now esteemed for many purposes a favorite fuel. It would be instructive to learn how much of the diminished waste is due to these causes, and how much to real improvement in underground work. Perhaps Mr. ASHBURNER'S report will tell us something on this head.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mr. Alfred R. West and the Guanacevi Mining Company.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Seeing in your issue of September 29th a communication from a Mr. J. J. Downing, in regard to the Guanacevi Mining Company, in which my name is freely used, I would say that my name has been used in a number of the transactions of this company, and always against my consent, having repeatedly forbidden its use in any way. I would like parties connected with this company in any way to write me, and I will give them full information in regard to this company's mines.

Respectfully yours, ALFRED R. WEST.

DENVER, COLO., Oct. 4.

THE TROY MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

A large number of members had gathered in Keenan Hall, Troy, on Tuesday evening, when Mr. R. W. Hunt, President of the Institute, called the meeting to order, and introduced the Hon. Martin I. Townsend, who delivered an address of welcome, to which Dr. R. W. Raymond responded.

Professor T. Egleston was then called upon for his paper on

RECENT RESEARCHES ON GOLD.

Professor Egleston has been trying hard to find gold that will not amalgamate, but did not succeed so long as he was working in the wet way. He suspected that arsenic and antimony might be the cause of the losses of gold in working ores on a large scale, and hit upon the happy thought of melting mispickel together with given quantities of metallic gold, as he had no auriferous mispickel ores at his disposal. This fused material he roasted with the greatest care; and when he tried to amalgamate the gold, he could only get from 40 to 50 per cent out of it, although he tried the Designolle process with and without acids. He found the rest of the gold in the tailings. This discovery Professor Egleston believed to be one of importance, and he is now engaged in following out the cue it furnished him. He repeated former experiments, by which he claims to have shown that beaten gold will not amalgamate, at least not before it has been annealed. He obtained gold used for jewelry from Tiffany & Co., of New York City, rolled it down as far as he could, and then hammered it. It would not amalgamate as usual; but, after it had been put into an acid bath or brushed, it would promptly amalgamate. Professor Egleston reached the conclusion that there must be a film on the surface of the gold-dust which prevented it from being attacked by the mercury, and he has now set himself the task of finding out what this film is. It is not grease, because he avoided that with the most scrupulous care; but Professor Egleston suspects arsenic, antimony, lead, zinc, or copper. Professor Egleston did not enlighten the meeting as to the methods by which he proposes to solve this delicate question, but he has promised to follow the matter up. He has been vainly trying to get "rusty" gold, but as yet has not been able to secure any. If there is such a thing, the difficulty in amalgamating it is probably due to deposition of some metal or substance on the outside of the gold.

Mr. R. P. Rothwell, in opening the discussion on Professor Egleston's record of the results of his researches, stated that he had worked hundreds of tons of auriferous mispickel, and had not found it as refractory as it was represented to be in the paper. By amalgamating previously roasted ore, he had obtained from 80 to 86 per cent of the gold; and by chlorination, which requires a much more perfect roast, he had taken out up to 94½ per cent. Professor Egleston believed that the explanation of the discrepancy between these results obtained on a large scale, and the results of his laboratory test, lay in the fact that he had to prepare his auriferous mispickel artificially.

Dr. R. W. Raymond then followed with his paper on the

LAW OF THE APEX.

Dr. Raymond, speaking often in a humorous strain, sketched briefly the historical development of our national mining laws, and then dwel in particular on the ambiguities growing out of the introduction in the last law of the word "apex." He illustrated how the law had been interpreted in seven different ways, when it referred to wide veins in particular. He gave suggestions as to the means of avoiding much of the hardship of the law, and spoke strongly, in concluding, in favor of square locations, which are now, in consequence of a recent decision of a United States Court in Colorado, on placer claims, practically in force, pending a decision of a higher court.

After a few brief announcements, the meeting adjourned, the members gathering at the Troy Club, where they for the first time experienced that Trojan hospitality which was to contribute so largely toward making the meeting so successful a one.

Among the members attending the meeting are:

R. W. Hunt, President, Troy; Dr. T. W. Drown, Secretary; John Fritz, Bethlehem, Pa.; J. E. Johnson, Longdale, Va.; W. S. De Camp, Boonton, N. J.; W. F. Durfee, Bridgeport, Conn.; P. Barnes, Joliet, Ill.; P. Roberts, Philadelphia; Philip W. Moen, Worcester, Mass.; W. S. Saunders, New York City; Alfred E. Hunt, Pittsburg; Frederick P. Dewey, Washington, D. C.; Stephen Baldwin, New York City; Martin Coryell, Lambertville, N. J.; R. W. Raymond, New York City; John Birkinbine, Philadelphia; I. P. Pardee, Stanhope, N. J.; E. S. Moffat, Scranton, Pa.; A. B. De Saulles, Dunbar, Pa.; R. P. Rothwell, New York City; Dr. Thomas Egleston, New York City; J. C. Platt, Waterford, N. Y.; J. A. Burden, H. Burden, Henry C. Shaw, John H. Mars, J. M. Sherrerd, Troy; J. C. Bayles, A. F. Hill, C. A. Stetefeldt, C. M. Rolker, New York City; Dr. Persifor Frazer, Philadelphia; L. G. Laureau, New York City; Dr. Fr. M. Wolff, Berlin, Germany; W. B. Kunhardt, G. Curtis, New York City; R. Crocker, South Pueblo, Colo.; G. J. Atkins, Pottsville, Pa.; Robert Forsyth, Chicago, Ill.; J. B. Mackintosh, Hoboken, N. J.; Charles Kirchhoff, Jr., New York City.

WEDNESDAY'S PROCEEDINGS.

Early in the morning, the members were driven in carriages to the works of Messrs. Fuller & Warren, of the Clinton Stove Foundry, a very large establishment, a good representative of a very large and flourishing industry, of which the sister cities, Albany and Troy, are the great centers in this country. They witnessed the molding, and went through a number of other shops in which are carried out the many auxiliary processes required to turn out the bright and cheerful stoves for the most luxurious as well as the most humble homes. Many details in the system of organization of so large an establishment were explained to the visitors.

A visit was next made to the merchant steel and rail mills of the Albany & Rensselaer Iron and Steel Company, which we described fully in a recent issue. All the departments were running full, and the works were seen to the best advantage.

Again taking the carriages, the members were driven to the Burden Iron-Works near by, and were at once taken to the most interesting feature of the establishment, the horseshoe mill. The iron is rolled down in a number of two-high trains to the proper section for the horseshoes, and after leaving the rolls, is run into long heating-furnaces entering one end, and as it issues from the other end, it is delivered directly into the horseshoe machines, of which there are in all eight, three of them being in the main mill. These machines, which were designed by the late Mr. Burden, seize the red-hot bars, and by a series of movements which it would be impossible to describe without the aid of drawings, cut it into lengths, and bend it into the form of the horseshoe, simultaneously giving it the two cuts under the shoe in which are located the holes through which the nails pass. Thus prepared, the blanks drop upon an underground carrier, which takes them to an adjoining building, in which stands a long row of punches, by the aid of which the holes are punched through the blank. As yet, the latter are of uniform width. They are delivered into heating-furnaces in which they are brought to a red-heat. They are then drawn out, and by boys are fed into the swaging-machines, the invention of Mr. James C. Burden. These machines, of which there are six, give the shoe its final form. The works have a capacity of 160 tons of horseshoes per day. After admiring the shipping facilities of the horseshoe department, the visitors were taken through the puddling and merchant mills, in which the well-known brand of iron, "Burden's Best," is manufactured. The mills are very extensive, have modern furnaces, two-high rolls and vertical engines throughout. After a walk through the extensive machine-shops, a visit was paid to the blast-furnaces, one of which was just preparing to go into blast. Blast is furnished by two horizontal engines designed by the late Mr. Rumpf, of the West Point Foundry. After being shown the beautifully equipped general offices of the works, the members were taken to the "water-mill," the chief curiosity of which is a 60-foot water-wheel, built in 1850, which has since been running steadily, needing only occasional trifling repairs of the wood-work. This wheel was designed by the late Mr. Burden, the stamp of whose genius the works still bear in many departments.

After partaking of the hospitality of Mr. Burden, at his country-seat, the members resumed work, and went to the Albany mill of the Albany & Rensselaer Iron and Steel Company, and later to the Bessemer mill.

THE SECOND SESSION

was opened by a paper read by Mr. Robert Forsyth, of Chicago, on the

BESSEMER PLANT OF THE NORTH CHICAGO ROLLING-MILL COMPANY,

which was designed at a time when the adoption of the basic process in this country seemed imminent, and it was therefore thought best to so arrange the new plant at South Chicago as to allow for its introduction; and in view of the economy of fuel and labor, it was decided to build a plant permitting at the same time the use of metal directly from the blast-furnace. The small size of the ingots, 12 inches square and long enough for three and four rails, and the large number cast from each heat of 10 tons made it necessary to provide a good deal of room in the casting-pit and to furnish extra facilities for handling ingots. To meet the delays incident to the basic process, it was decided that three vessels should be used with the Holley removable converter-shell, a plan involving the conveyance of the old vessel shell to a convenient repair-shop and the substitution of a newly lined shell in its place. The difficulty of working these vessels to one casting-pit without the use of cumbersome and unwieldy ladle cranes was obvi-

ated by the method suggested by Mr. L. G. Laureau, of transferring the steel ladle from the receiving-cranes to the casting-crane. Between the jibs of the cranes was put, at South Chicago, a short piece of fixed track on which the ladle may rest on its transit from crane to crane. The use of the transfer ladle permits the iron and spiegel ladles to be brought in front of the vessels instead of behind them, thus allowing the use of simple runners or none at all.

The buildings are: A boiler-house, 118 feet by 44 feet; an engine-house, 114 by 48 feet; a converting building, 108½ feet by 102½ feet, to which adjoin a spiegel cupola building, 66 feet by 47 feet, and a shed; a repair shop, 238 feet by 75, with a ladle drying shed; a producer-house, 60 by 44 feet; and a grinding-house, 100 by 50 feet; the total ground area covered by the work being about 60,000 square feet.

The engine-house contains two separate horizontal condensing blowing-engines, with steam-cylinders 54 inches in diameter, and air-cylinders 66 inches in diameter, by 60 inches stroke, the design being by Mr. Kriete, the chief-engineer of the company.

The converting building contains three 10-ton vessels, two receiving ladle cranes, one casting ladle crane, three ingot cranes and one crane used in cleaning and handling ladles. The ingot and ladle cranes are placed symmetrically about a casting-pit of 20-feet radius, and command its whole circumference. In this pit, there is room for forty 12-inch molds, occupying nearly three quarters of the available casting space, and there is an ingot crane for each set of molds, so that three heats may be working at the same time, if necessary.

The three 10-ton vessels stand with their trunnion axes in the same line, 18 feet above general level and are 26 feet apart from center to center. Each vessel, which is of the old form, not being concentric, has a cast-iron trunnion section in one piece, inside of which is hung the shell. The vessels are rotated by horizontal hydraulic cylinders, 20 inches in diameter, with racks and pinions of cast-iron. They turn through an arc of 270 degrees. Under each vessel, is placed an hydraulic lift for handling the vessel shell, and putting on bottoms, with a 24-inch plunger and 8-foot stroke. Though not used, one of these lifts was found to have a capacity of 98,000 pounds at 300 pounds accumulator pressure.

In front of the vessels, and 19 feet above general level, runs the elevated railroad, on which metal and spiegel are brought, the one from the blast-furnace, the other from the spiegel cupola building. The scales and tracks in this building are so arranged that, if necessary, any cupola may be melting siliceous pig.

The metal is brought from the furnace, a distance of 1500 feet, in 10-ton ladles mounted on cars up an incline with an average rise of two feet per 100 to a level siding just outside the converting building. From this siding, carried on arches, the ladle-car is pulled by a special locomotive into the building, and the metal is poured into a short runner directly in front of the vessel.

In front of the vessels, are the two receiving ladle cranes, so placed that both of them may serve the center vessel of the three, while the end vessels are reached by one crane each. The ladle on one of the receiving cranes, when filled with steel, is swung around until it points to the center of the casting-pit, when it is lowered until the outer ends of the jibs rest solid upon iron blocks which carry one end of a piece of fixed track some 10 feet long, placed in line with the crane jibs. The other end of this track is carried upon similar blocks, upon which the jibs of the casting-crane rest when lowered in the same way. The carriage and ladle are thus transferred to the casting-crane.

By the general arrangement of the cranes, the great blowing capacity of the vessels is fully utilized, and the quantity of product becomes a question of keeping the pit clear of ingots.

So far as possible, all work of repair and renewal is taken out of the converting room and done in the repair-shop. Newly lined ladles are dried under a gas firing-hood, of which there are twelve. The bottoms are of the "dish" pattern, and each bottom stands on a car which it never leaves except to go on a vessel. The vessels and bottoms were designed for making heavy charges of direct metal, and having in view the occurrence of "long blows," care was taken to provide plenty of wind. There are 18 tuyeres in the bottom. The blast-pipe on the vessel is 13 inches in diameter, and the blast-main is a 15-inch pipe.

The largest blow on record at South Chicago lasted 45 minutes; but 10 tons of metal with 2 per cent of silicon are commonly blown in from 10 to 12 minutes, and one blow of 9000 pounds was finished in three minutes. At the rate of 12 minutes to a blow, 5 heats an hour can be made regularly; for with three vessels, blowing can go on continually, and by the use of two ladles and ten transfer cranes, a ladle is always ready for a charge when finished. As this rate of working will keep the vessels constantly employed, the possible limit to the product of a Bessemer pit, 600 tons in 12 hours is reached.

The possible need of cupolas for remelting the Sunday iron and using up scrap was recognized in the design, but was not put up. It would seem that, for a plant to work mixed cupola and direct metal, and having a large furnace capacity, the cupolas might be advantageously placed near the furnaces, and be considered, in fact, adjuncts to them, if the office of the cupola is merely to remelt Sunday iron.

The South Chicago practice differs in some points from that at other works. With reasonably good ores, success in working direct depends primarily upon intelligent and scientific furnace management, and in almost equal degree, upon careful and constant watchfulness in the Bessemer works. With the object of knowing what sort of metal is about to be blown, the plan was adopted, at South Chicago, of taking a test from the metal as it ran to the vessel, which was cast in a chill, and cooled at once in water. The fracture of this "chill" enables the blower to judge very accurately of the probable heat of the charge, and the necessary additions to be made. Though the quick determination of the silicon has been brought to great perfection at the Edgar Thomson Works, the chill furnishes all the necessary information in a better form.

It is surprising what great variety of metal the Bessemer process can deal with under favorable circumstances. White iron with 0·75 silicon has been successfully converted, and so has iron with 4 per cent, with all the intermediary grades. But the best metal for direct working is found to be that with from 1 to 1·5 per cent of silicon, partly gray, and with not more than 1 per cent of manganese. Ten tons of such metal can be blown in from 10 to 12 minutes, and, phosphorus being low, will make good steel. The higher limit of silicon is perhaps the safest as affording reasonable security against sulphur, and there is no difficulty in dealing with 2·50 or even 3 per cent of silicon, quantities which insure that sulphur in hurtful amount will not be present.

It became evident, very soon after work began at South Chicago, that there would be difficulty in keeping down the heat of the metal by means of scrap alone, and steam connections were therefore put in to each of the vessel blast-pipes with the object of cooling the metal by means of steam. To Mr. W. R. Walker, is due the credit of having made the use of steam in the Bessmer process a success on a large scale, for all previous applications had been hardly more than experimental. As used at South Chicago, the apparatus consists of a 2-inch pipe tapped into the blast-pipe leading to each vessel. As soon as the metal in blowing shows signs of undue heat, steam is turned on and kept on until, in the judgment of the blower, the proper cooling effect is produced. An enormous quantity of steam is sometimes required, the full opening of a 2-inch pipe at 50 pounds pressure being occasionally given. Nothing can be more effectual than this way of cooling metal. There is no handling of scrap, and the whole matter is under the complete control of the blower, who, by opening a valve, can regulate the temperature of the metal with the greatest nicety. A capital advantage of steam is, that with its aid metal high in silicon can be converted without difficulty, so that a furnace may make pig in which sulphur may be kept low without complaint from the Bessemer works. No removal of sulphur or phosphorus is effected by the use of steam. The steam is evidently condensed before reaching the metal, because the tuyere-box and blast-pipe are quite cold, whereas without steam these parts are usually hot enough to burn the hand, and water runs freely from any leaky joint about the bottom. By using steam, the consumption of scrap may be confined to what the Bessemer works itself produces.

At South Chicago, vessel linings are balled up with finely ground patching stuff, and last for months; and bottoms are made in much the same way. A 10-ton vessel has been lined up in seven hours, and a bottom has made as many as 29 heats, yielding 238 tons of ingots; and the average life of a whole month has been 18½ heats, yielding 159 tons of ingots, as against 55 at North Chicago in 1875. One hinderance to large output which was foreseen and, so far as possible provided for is the large number of small ingots cast. Thus, to get 381 tons, no less than 436 ingots had to be handled in an equal number of molds. The cranes and trucks are so arranged that this large amount of handling is done without difficulty and without interfering with any other operations. But some mechanical device is very much needed for handling ingots and molds.

President Hunt, in opening the discussion, referred to the introduction of the basic process, stating that an engineer who had closely studied it abroad had come to the conclusion that it would not be profitable to replace the acid by the basic process in this country, unless the difference between Bessemer pig and phosphoric iron was at least $3 per ton. Mr. Durfee called attention to a table giving the results of early experiments on the back pressure in turning converters, and exhibited a design to take the place of the rack movement now generally used to tip converters. Mr. Hunt called attention to the fact that it was Mr. Durfee who had been the first to make a successful blow of Bessemer steel at the experimental works at Wyandotte, the metal being taken directly from a small charcoal blast-furnace. After a few brief remarks by Mr. Durfee and Mr. Forsyth, Mr. Alfred E. Hunt, of Pittsburg, Pa., read his paper:

SOME NOTES AND TESTS OF AN OPEN-HEARTH STEEL CHARGE MADE FOR BOILER-PLATE.

The charge to be described was made in a seven-ton furnace, with a hearth twelve feet long and eight feet wide, with three gas and three air-ports on each side. The stock of the entire heat was charged cold in one hour and five minutes, a part of the pig being first placed upon the bottom to protect it, then upon it the plate-scrap and blooms, and finally the remainder of the pig—some two thousand pounds. In five hours and twenty-five minutes after beginning the charge, the metal was melted down level, and two hundred pounds of hot twelve per cent spiegel were charged, care being taken to have it entirely immersed in the bath. In two hours more, the bath was thoroughly melted and hot, and began to boil; that is, the carbon began to be oxidized and evolved through the bath of covering slag as carbonic acid and carbonic oxide gases. Seventy-five pounds of lumps of Republic specular iron ore were added at this time, increasing the action, so that in ten minutes after, the metal was in active ebullition. A test of the metal showed it to have about 0·90 per cent carbon. One hour after the first ore was added, a test was again taken, after thorough rabbling of the metal, and it was found to be 0·37 per cent carbon. One hundred pounds more of lump Republic ore and about seventy-five pounds of limestone were then added, and fifty minutes later, after the bath was thoroughly rabbled, a test showed the metal to have 0·23 per cent carbon. Twenty-five pounds more of Republic iron ore were added, and the metal allowed to boil for twenty minutes, when a test, after rabbling, showed the carbon to be 0·18 per cent and the manganese to be 0·01 per cent; the slag fracture was vitreous and of a very dark-green color. About forty pounds of limestone were added, and, the metal being hot and in a state of quiet ebullition, a hickory pole of twelve feet length and about four inches diameter, was run through the aperture in the center door and held in a steady inclined position in the bath, with the end touching the bottom, the pole being shoved in farther as it was burned away. The bath was carefully watched to see that the action that ensued was not too violent, the pole being several times pulled out to check the splashing of the metal. This "poling" of the metal lasted for about ten minutes. Ten minutes were then allowed for the bath to quiet down, when, after rabbling, two tests taken in different places in the furnace showed between 0·14 per cent and 0·15 per cent in carbon. The metal was hot, and rapidly cut off a hook of inch iron in the bath, leaving no steel but only slag caught on the hook, on cooling the sharp pointed end that was withdrawn from the furnace. The furnace test of 1¼ by 1 by 5 inches long showed a good clear silvery fracture, which had to be indented by a chisel for about three eighths of an inch on each side before giving way to the blows of a heavy sledge. The final addition of 150 pounds of seventy-two per cent ferro-manganese was then added, the metal was thoroughly rabbled and tapped into the ladle just twenty-five minutes after the pole was taken out of the bath, and nine hours and

twenty minutes after the first piece of stock was charged. The metal was cast into a hot ladle, and was bottom-poured into four plate ingots 7 inches thick by 37 inches wide by 48 inches long, and weighing about 3300 pounds each ; and one ingot, 18 inches square and 48 inches long, on the same group, weighing about 4000 pounds ; and one ingot, 7 by 15 by 22 inches, weighing 630 pounds ; and one 12-inch square ingot, weighing 1620 pounds, which was top cast. The charge yielded 19,430 pounds of sound ingots, or 92·35 per cent of the charge ; 600 pounds of runners and scrap, or 2·85 per cent of the charge ; and 1010 pounds loss, or 4·80 per cent of the charge. Two hundred pounds of Republic ore were used in reducing the bath, and 115 pounds of limestone to clear the slag of metal.

The charge consisted of—

No. 1 charcoal Titan pig-iron	6,080	pounds.
Open-hearth plate scrap	4,570	"
Chateaugay blooms (62 in number)	10,100	"
12 per cent German A U spiegel	200	"
Weight of original bath	20,890	"
Final addition of 72 per cent ferro-manganese	150	"
Total charge	21,040	"

The analysis of the finished metal and of the constituents of the charge is as follows :

	Carbon.	Manganese.	Silicon.	Sulphur.	Phosphorus.	Copper.	Silica.	Carbonate of lime.	Iron.
	p. c.	per c.	per c.	per c.	per c.	per c.	per c.	per c.	p. c.
Furnace test of finished steel at tapping	0·15	0·41	0·020	0·023	0·033	0·023	... ...	.....	.....
Drillings from rolled plate	0·15	0·29	0·021	0·025	0 037	0·025	.....	.....	.....
Plate scrap used in the charge	0·15 to 0·18	0·25 to 0·35	0·025	0·025	0·040	0·025	.....	.....	.....
Chateaugay blooms used in the charge	0·10 to 0·30	none	0·013	trace	0·015	none	slag 25–50	.....	.....
No. 1 Titan charcoal pig used in the charge	3·75	0·112	1·958	0·006	0 050	none	.....	.....	.....
12 per cent German A U spiegel used in the charge	4·60	11·290	0·050	trace	0·076	0·310	.....	.....	85·50
72 per cent ferro-manganese used in the charge	5·08	68·520	0·062	trace	0·226	0 138	silica	.....	26·15
Republic iron ore used in the charge	.....	0·144	.....	0·070	0·030	0·063	1·393	.....	67·80
Limestone used in the charge	.....	none	.....	0·054	0·028	none	13·49	84·10	1·04

Tests were made, which, though too few to generalize upon, are all typical results which have been confirmed very many times, so that from them, as illustrations merely, the following propositions are stated :

I. There is about 25 per cent reduction in the percentage of elongation in the results of a specimen of soft steel of 8 inches between shoulders from those of two inches in length, and the percentage of elongation varies proportionately to the length of the specimens measured ; hence figures, as often given, of the percentage of elongation, without stating the length of the specimens, are meaningless.

II. The percentage of elongation measured at "the moment of failure," gives from 15 per cent to 20 per cent lower results than those measured in the usual way, after the rupture, or as finally automatically recorded by the testing machine.

III. As steel is usually rolled with the most of the work in the direction of the length of the plate, specimens cut transversely to the grain of the metal in such cases give slightly lower results than those cut with the grain.

IV. Soft plate steel, of over one half inch thickness, needs to be reduced from an ingot of at least nine inches thickness. A very important and often occurring cause of defective steel is, that it has not had work enough ; that is, has not had sufficient reduction from the ingot to the finished steel.

V. An increase of from two to four thousand pounds per square inch. and a correspondingly lower elongation of from one to three per cent in two-inch length sections of soft plate steel, is obtained by casting ingots twelve inches by sixteen inches in section, and hammering them to slabs of about five inches thickness, and then, after reheating, rolling these slabs into plate steel over plates of the same heat of steel, which are rolled directly from the ingot to the plate, or over ingots rolled to slabs and reheated and re-rolled to plate, showing that there is a sort of hammer-hardening in this soft steel, which the subsequent reheating and rolling do not entirely remove.

VI. Soft steel, of no matter how low carbon, can be hardened to a certain extent by being heated red-hot and plunged into water, and hardened more when plunged into brine, and less when quenched, in oil.

VII. Soft steel, of no matter how low carbon, can be hardened, and then the temper drawn to a certain extent, as can be easily proved by the testing-machine.

VIII. If soft steel plates are finished at the rolls too cold, or are too suddenly chilled in the cooling down, a considerable decrease in ductility and increase in tenacity will be obtained between specimens from the plate without further treatment and specimens which have been carefully annealed before dressing.

IX. For soft plate steel bottom-poured ingots are more solid and uniform in structure, and yield much better plates than top-poured ingots.

X. The percentage of carbon in steel for practical work is usually obtained by the color method It is doubtful whether there are a half-dozen laboratories in the country where the color standards would perfectly agree ; so that before a general intelligent discussion of the properties of various kinds of steel can be had, it will be necessary for the steel-works chemists to agree more exactly as to their color standards for carbon determinations.

A few remarks bearing on the subject were made by Mr. P. Barnes, and, in the absence of further discussion, the Secretary read a paper by Mr. G. C. Stone, of Newark, N. J., on

THE DETERMINATION OF MANGANESE IN SPIEGEL,

in which were submitted the results obtained by analyzing the same sample of spiegel by different methods.

In all, forty-six determinations by fifteen chemists using ten methods are given ; these methods may be divided into four classes, that is, 1st. Williams's method. 2d. Other volumetric methods. 3d. Methods in which the manganese is precipitated and weighed as phosphate. 4th. Methods in which the manganese is precipitated as basic carbonate or hydrate in presence of large quantities of alkaline salts and weighed as Mn_3O_4. The results may be divided into, 1st, those below 13 per cent ; 2d, those between 13 and 14 per cent ; and, 3d, those above 14 per cent. If they are so divided, it will be seen that 71 per cent of the results below 13 per cent were by methods of the 1st class, 87 per cent of those between 13 and 14 per cent were by methods of the 2d and 3d classes, and 83 per cent of those above 14 per cent were by the 4th class.

Mr. Mackintosh, of Hoboken, submitted the data given in the paper to a mathematical analysis, while Mr. Alfred E. Hunt spoke of the homogeneity of samples of spiegel, referring to the fact that the finer material is richer in manganese than the coarser stuff.

ASBESTOS AND ITS APPLICATIONS.

Asbestos, a peculiar variety of the amphibole or hornblende family of minerals, is most largely found in Canada and Italy. It occurs in regular layers or veins, generally as a grayish-green rock made up of innumerable fine crystalline fibers which become soft, white, and of a silky luster when separated from each other by slight pressure. The thickness of the veins varies considerably in different localities, from a thin sheet, in the case of the variety known as mountain leather, to several inches in the deposits of the delicate amianthus found in the older crystalline rocks, in the Pyrenees, the Alps of Dauphiny, the St. Gothard, the Savoy, and Corsica. A single fiber of asbestos, heated in the flame of a blow-pipe, readily fuses to a white enamel, the varieties containing most iron being most easily fused, but in the mass it resists the heat of an ordinary flame, and for this reason it has recently begun to attract considerable attention. Unfortunately, the fibers of asbestos differ from all other known fibers in having a perfectly smooth surface and in being much less elastic than those of either animal or vegetable origin, in consequence of which all efforts to spin and weave them by modern machinery have until very recently entirely failed. In addition to amianthus and mountain leather, there are several other varieties of asbestos, for instance, mountain cork, which is a brownish or dirty-white deposit, less flexible and less regular than amianthus and mountain leather, and so light as to float on water ; mountain wood, a soft, opaque, brownish colored variety, which melts to a black slag before the blow-pipe ; and lastly, the common asbestos, which has recently been discovered in large quantities in Canada, in veins from one inch to two inches thick, and which is the kind most generally used for manufacturing the various articles to which we shall have occasion to refer.

The introduction of asbestos for such purposes as engine packing and jointing for pipes has been attended with very considerable difficulty. Of all materials, it is perhaps that which requires the most careful manufacture and intelligence in adapting it to its special purposes ; and when these have not been sufficiently exercised, users have been disappointed, and have not unfrequently given up the trial in disgust. As already stated, the peculiarity incidental to asbestos fiber for a long time baffled all attempts to spin it into a yarn without the intermixture of a certain proportion of flax or other vegetable fiber. Within the last few years, however, the difficulty has been overcome. and yarns capable of withstanding great tensile stresses can now be readily produced by machinery specially constructed for the purpose. One of the most important applications of this yarn is for the manufacture of steam packings. In making packing, it was at first not sufficiently recognized that the fibers of asbestos were apt to be largely charged with minute particles of pyrites ; and until this fact was appreciated, it was often found that the piston-rods were scored, the damage being attributed to the action of the asbestos itself, instead of to the impurities it contained. To obviate this defect, it therefore became necessary to thoroughly cleanse the asbestos from all stone and grit before spinning, for which duty machinery had to be adapted. The yarn now produced is quite pure, and is capable of being woven into almost any kind of fabric. But it was soon ascertained that special cases required special treatment, and though the plaited packing was generally satisfactory, it became evident that something else was wanted in the case of steam-engines with extremely high piston speeds. To meet this demand, the yarn was first woven into a cloth, which, being slightly water-proofed with vulcanized India rubber, was rolled up into a rope in much the same way as the canvas is treated in what is known as Tuck's packing, only without the rubber core. This packing answered admirably, and is much used in cases where the rapid destruction of ordinary packings gave rise to most serious inconvenience. The enduring powers of this asbestos block packing are quite remarkable. In one place, on being taken out after twelve months' working with steam of 70 pounds pressure, it was found to be perfectly good, and was accordingly replaced. It has often been erroneously stated that asbestos packing could be used without lubrication. No greater mistake could exist. It not only requires a good supply of oil, but demands careful attention on the part of the engineer in charge. If carefully manufactured and properly used, asbestos is the best material for packing the glands of steam-engines ; but if ignorantly made up and carelessly used, it is probably the worst.

A great deal of yarn is woven into cloth, and is adopted for a great variety of purposes. One noteworthy application is for fire-proof curtains, and several of these have been supplied by Mr. Bell for theaters in Great Britain, the United States, and elsewhere. So important is this material considered in regard to the prevention of the spread of conflagrations that a company has been formed in New York with the sole object of extending its use in the shape of protective shields, either permanently fixed or applied in case of a sudden emergency. In relation to this application, a fire-shield was recently exhibited at a meeting of the Firemen's Convention held at Rochester, N. Y., and attracted very great attention. The shield consisted of a piece of pure asbestos cloth about twenty feet square, and supported on an iron frame. A pile of pine wood saturated with petroleum and tar was built on the windward side

of the curtain, and set on fire. The blaze was tremendous, and the heat so intense that persons could not stand within fifty feet of the burning mass on the exposed side. On the side protected by the shield, however, the heat was scarcely felt, and a dummy erection of wood and glass, which was placed close beside it, was not in any way injured. The curtain, of course, did not suffer, and was as good after the experiment as it was before.

For forming the joints of pipes exposed to the action of moisture, and for man and mud-hole doors requiring frequent removal, asbestos woven cloth is very largely in demand. In these cases, asbestos millboard, which is the cheapest form of jointing material, is comparatively worthless, if, indeed, it is not absolutely objectionable, from its permeability to water, which soaks through and attacks the iron of the bolts, and it was therefore necessary to devise a combination which would effectually resist the heat and damp. This is provided in what is known as asbestos and India-rubber woven sheeting, which is made in any thickness, and is supplied either in sheets to cut to the required shape, or in a tape from one to two inches wide, which can be cut to lengths and bent to circle or oval without puckering. When all other materials have failed to give satisfaction, this has answered admirably, and in the case of man-hole and mud-hole doors and feed-water pipes, the joint can be broken twenty times without requiring renewal of the strip.

The last application of the yarn which we shall mention is the manufacture of rope and cord. Having great tensile strength, and being unaffected by heat and damp, this material is in course of introduction for sash-lines and for ropes of fire-escapes. It is also adopted for covering rollers in print-works, especially when aniline dyes are used, and in cases when it it exposed to great heat and to the action of hydrochloric acid. Asbestos cord has also been found to be the most effectual material for making the joints of the hot-air pipes for blast-furnaces, which are exposed to an exceedingly high temperature. The jointing consists of an iron ring wrapped with the cord, which is simply put in place and nipped between two flanges, and, being unaffected by heat, lasts a very long time.

We now come to an entirely different manufacture of asbestos, in which the rock, after being broken down and reduced to fluff, is pulped and formed by pressure into sheets from $\frac{1}{64}$ inch to $\frac{1}{4}$ inch in thickness. This millboard, as it is called, is used for making joints not exposed to the action of moisture, such as for dry steam, air, and gas. When properly made and used with faced surfaces, this material affords the easiest and most cleanly method of making a joint, while, if the faces are previously painted over with boiled oil, the danger of having a troublesome leaky joint is reduced to a minimum. The board is easily cut to the desired size, and as no time is required for drying and setting, steam can be turned on as soon as the bolts are screwed up. A much commoner and cheaper description, though it still possesses most of the essential qualities, is manufactured for fire-proofing floors and ceilings. It is made in sheets about $\frac{1}{32}$ inch thick, and is applied in the simplest possible way, either above or below the joists. It is also used for lining the walls of wooden buildings, where, from its non-conducting and fire-proof qualities, it affords an immense protection in case of the outbreak of fire. As an insulator of electricity, asbestos in one form or another is greatly sought after. Millboard has for some time been used in the construction of dynamos, while cables and leads covered with plaited yarn have been adopted in many installations. The remaining uses of asbestos which we have to notice appear to be mainly in the production of fire-proof cement and putty, for which there is considerable demand for certain kinds of joints, and in the manufacture of fire and acid-proof lumps, blocks, and bricks. The ordinary gas fire is familiar to every one, and it will suffice to point out that asbestos enters largely into the composition of the artificial fuel upon which the success of the fire in a great measure depends.

THE PRESENT CONDITION OF THE MINES OF THE TOMBSTONE MILL AND MINING COMPANY.

The tendency of Eastern purchasers to secure a large amount of territory when they are buying mines has often been laughed at by their Western rivals, who know that, if one mine is a failure, the fortunes of the owners will not be improved by the possession of other territory of no better quality. But this reasoning must contain a fallacy; for there is more than one instance in the recent mining history of the West of marked advantages springing from this habit of Eastern investors. The Tombstone Mill and Mining Company is one of the best examples of this system of purchase. Holding nearly a dozen mining claims, the company has made four of them into extensive mines, and has carried work to a point of useful production on one more with the prospect of still further extensions. Their producing mines are the Good Enough, Tough Nut, West Side, and Lucky Cuss, and the Defense has also been yielding steadily, though without being pushed. Among their other claims is the Tribute, a claim which has always borne the reputation of containing a good vein, though until two months ago no one had found it. At that time, some prospectors out of work found croppings, and secured from the company a short lease. The vein is parallel with the West Side claim and immediately adjoining it. Its ore has a close resemblance to that from the latter mine, and the officers of the company say it will be opened by them as soon as the lease expires. Nearly parallel with this vein and on the other side of the West Side, is the Defense, a claim that contains a vein of base ore, not suitable for free milling. This has been worked steadily for a year by a small force, the product being a smelting ore, which has been sent to the company's furnace. Besides these openings, some ore has been taken from the Intervenor, East Side, Old Guard, and other claims, all in the same portion of the Tombstone District, and lying between the old belt of free-milling ores and the newly opened manganese mines.

A new strike was also made on the Tough Nut mine of the Tombstone Company, and ore found extending from the surface down to the depth of about 90 feet. Its position is directly among the large ore-bodies which have made this company so prominent; but whether it will end in an addition to them or continue without increasing its dimensions, can not be predicted. The high grade of the ore is considered a favorable indication in Tombstone, whether this high grade belongs to a surface outcrop or an underground body.

But though the other claims have yielded a considerable amount of ore, the Tombstone Company's work has been done mainly in the West Side mine, where three important tasks have been accomplished recently, or undertaken—stoping out the 3d level, opening the 4th level, and sinking to the 5th level. The last-mentioned is the completed work. The 5th level was reached in September, and a cross-cut run to the vein before the close of the month.

The 4th level was begun the last of May, and is now nearly four hundred feet long. It has shown a greater length of ore-bearing ground than any other level opened in the mine. At present, it extends from a point about 180 feet north of No. 3 shaft to a point more than 200 feet south of it, and ore has been found at two other points, which carry the line of prospecting 400 feet farther south. The winzes necessary for the air-connections in this direction are already sunk, and the opening of the drift will be greatly facilitated.

The opening of this mine has developed two interesting points. The west side claim is 1500 feet long, and the vein-croppings are very plain from the north end line to No. 1 shaft, a distance of about 1100 feet. The vein is just what the croppings indicate it to be, a nearly straight line of ore, not remarkably thick, but more than usually continuous. Near the surface, the vein was mostly from two to four feet thick, and remarkably straight. On the third level, undulations in the course came in, and at one point, the vein branched. One of these branches continues to bear the name *main* vein, because it preserves the old direction, while the other trends to the east.

Between these two branches lay a body of ore of unusual formation. Instead of being a solid mass, with barren spots distributed irregularly, it was made up of ore-seams lying between beds of barren limestone. The ore-seams ran from one of the vein branches to the other, lying directly across the regular direction of the vein. In form, the mass viewed from the south had the shape of a pear; but a side view showed that its length was much greater than its width, being 110 feet long and 40 at the greatest width. Added to the peculiarities of this singular formation was the fact that the alternate layers of ore and limestone were strongly bent, dipping 50 degrees north at the north end, and about 55 degrees south at the south end. The ore was of high grade, and always richest at the apex of the fold.

Connected with this body and forming one of its downward prolongations, were "shoots" or layers of ore, that have been encountered again on the fourth level. In one of them, was found a mass of telluride ore, from which several tons of ore, worth $1200 per ton, were sent to the mill. This development is unique in the Tombstone District, though tellurides in small pin-points have been seen in the ores before.

The other point demonstrated by the opening of the mine is the steady improvement of the south end as depth is reached. At this place, there is a wide ravine on the surface, about fifty feet deep. Under this ravine, the vein was so poor on the first level that the drift was not carried across it. On the second level, the ravine was crossed in ore that was just below milling value. Improvement continued to the 3d level, where the stopes are somewhat extensive, and some bunches of excellent ore have been found. In this portion of the mine, there is a winze down to the 4th level, which gave an excellent grade of ore through its whole depth.

These conditions, probably, point to the effect of surface action in dissolving and redistributing the contents of the vein; and if this is the case, the south end of the West Side may become for a time its richest ground, carrying in one level the accumulated reserves of two or three hundred feet of leached-out ground.

The West Side ore contains more gold than the ore from the flat ore-bodies which this company has worked, and also an amount of lead, which indicates that the concentrating-works of the company will have a successful run.

Of the other mines of the company, the Lucky Cuss is the only one that has exhibited any peculiarities of interest. There the manganese used in the lead furnace as flux is mined, and also some lead ore containing silver. A new outcrop of the latter character was found during the summer, and has yielded good ore.

In mining the manganese, small pockets of carbonate ore, rich both in lead and silver, have always been encountered; and at the depth of 175 feet, there has been a more extensive change in the composition of the vein-matter. The ore contains less manganese and more iron, alumina, lead, and silver than before. A change of this kind was expected, but it had been delayed so long that its probability had become doubtful, especially as other manganese mines in the neighborhood had been worked much deeper and more extensively than the Lucky Cuss without finding any but transient changes in the constitution of the vein-matter, or any but insignificant bodies of carbonate ore.

It is quite possible that the Lucky Cuss may return to the strict manganiferous ore with which it began. In one respect, however, it is not likely to go back on its record. Its manganese has improved materially in silver value as the mine deepened, and this is reported to be the case in other Tombstone mines of like character, so that mines with a manganese gangue may be put down among the class that lose their metal by exposure to the elements.

The works for treating the company's ore are situated at Charleston, ten miles from Tombstone. There is an amalgamating mill for the "dry" silver ores, a concentrating establishment for the tailings and ores that contain lead, and a furnace where the concentrates are smelted.

The company has been obliged to renovate the silver mill almost completely, new pans having been put in throughout during the summer. Practically, this makes a new mill of it, with just as good prospect of running four years to another repairing time as it ever had.

Besides this, the old concentrating machines have been removed to a new building, where they will work with new machines that will more than double the capacity of the works. The new works are nearly finished, and will probably be running before November. They have been so planned that the entire daily product of the mill will be treated in addition to a quantity of old tailings as great as was treated in the first concentrating-works, and arrangements have also been provided for crushing and concentrating ores that are too base to be proper subjects for treatment by amalgamation. These arrangements secure the provision of sufficient material to keep the furnace constantly at work,

and in fact may require the increase of the company's smelting plant. In addition to these arrangements, a long lease of a lead mine has been secured, the ore from which has been used in August and September.

The policy which has controlled all these arrangements was based upon the evidence, shown in the last report of the superintendent, that the tailing-beds resulting from the treatment of the company's ores, taken in connection with the Lucky Cuss mine, contained silver enough to insure the payment of the company's obligations, without drawing upon the new supplies of the mines. The object sought was to organize the treatment of these tailings as an entirely separate branch of the company's business, independent of future contingencies; so that the whole system, once set in operation, would finally result in the payment of all obligations. This has now been done, and it is believed that the only questions that remain to be considered are those that relate to increasing the rapidity of this work and lessening the time of realization. Some experience has been had in this respect, and steps taken, which, however, can not be completed until November. The furnace has run steadily and successfully since last May, the only difficulties encountered being in matters of detail which were corrected as they developed themselves.

Taken as a whole, the system of work and the plant provided at Charleston form, probably, the most complete establishment in the country for the treatment of dry silver ores. While the new concentrating-works were in progress, the company bought considerable quantities of ores from Tombstone mines, smelting them with the accumulation of concentrates from its machines. The result showed that, even in this camp of "dry" silver ores, there is quite a production of ore suitable for furnace treatment.

The introduction of concentrators and a furnace as a mode of treating tailings from a silver mill is undoubtedly an interesting innovation on the usual practice. Its results have been favorable. The tailing-beds have already yielded a greater profit than could have been looked for from any other mode of treatment. The fact that the whole work has been of an experimental character until now prevents an accurate comparison of results. The purchase of ores to fill out the interregnum caused by rebuilding the concentration-works would naturally lessen profits, besides disturbing the regular operation of the system; but the company is reported to have derived a steady profit from its operations, and to have paid a large sum on its indebtedness.

THE SOURCES OF LOSS IN THE COMBUSTION OF FUEL.

The many tests made on the continent during the past fifteen or twenty years have not furnished much material of value for ascertaining the comparative efficiency of boiler-furnaces, and the combustion of fuel in them. As Mr. William Kent pointed out recently, the few data on record here can not be accepted, although some of them appear to us to possess a value as giving data as to the relative merit of different kinds of fuel. The Germans, in their thorough way of taking up technical subjects, have quite recently struggled with this one, and two leading associations, the Society of Engineers and the Association of Steam-Boiler Users, appointed a committee which has just reported. Mere competitive tests, without a full examination of the entire process of combustion, are of little use. The work of the fireman must be checked by chemical analyses and a complete set of observations. There are cases on record where the same fireman, using the same coal in the same boiler on two successive days, evaporated 8·45 and 7·37 pounds of water per pound of fuel. The Germans, therefore, insist that the only means of getting at a good estimate of the work of a fire-place is to analyze the gases of combustion, and compare the loss of heat through that source with the theoretical calorific value of the fuel. They would thus be saved the expense of many costly experiments to test boiler appliances and settings, for which their inventors generally claim, in a modest way, a saving of at least from 20 to 30 per cent of fuel. It is true that such an examination of the gases entails expenditure and is troublesome; but the results afford a clew to many sources of loss, and thus pave the way for an improvement.

The report of the committee referred to gives interesting instructions on the method of computing the theoretical calorific value of a fuel and the loss through the escaping gases of combustion.

The quantity of air L required for the complete combustion of a kilogram of fuel, containing by analysis c parts of carbon, h parts of hydrogen, s parts of sulphur, o parts of oxygen, and w parts of water, may be calculated as follows:

$$\left(\frac{2{\cdot}667\ c + 8\ h + s - o}{21 \times 1{\cdot}43}\right) \times 100 = L \text{ cubic meters.}$$

There are wide variations in the data chosen in the computation of the calorific value of fuel according to the Dulong formula. Some make use of the simple formula,

$$W = 8000\ c + 34{,}500\ (h - \tfrac{1}{8}\ o).$$

Others make deductions for the hygroscopic water, as under:

$$W = 8000\ c + 34{,}400\ (h - \tfrac{1}{8}\ o) - 637\ w.$$

Others take into account the heat required to evaporate the total water formed during the process of combustion, like Ferrini, who uses the following formula:

$$W = 8100\ c + 34{,}500\ h - 600\ (w + 9\ h).$$

The most accurate method certainly is to use the calorimeter; but the determinations with its use are so troublesome that, for practical purposes, computation from elementary analysis of the fuel will probably be generally retained. The commission rejects the practice of assuming that the oxygen found by analysis should be computed as combining with a corresponding quantity of hydrogen in forming water. It is argued by them that due deductions should be made for the fact that, by the combustion of the hydrogen of the coal, steam is produced, which carries off a certain quantity of heat. They therefore reduce the calorific value of the hydrogen to 28,800 instead of 34,220 calories, which is the average of the determinations of Thau, Andrews, Thomsen, Favre & Silbermann, and Schuller & Wartha. They have therefore put forward the formula:

$$W = 8100\ c + 28{,}800\ (h - \tfrac{1}{8}\ o) + 2500\ s - 600\ w.$$

The theoretical calorific value of a fuel may thus be found from its analysis,

When the question is to ascertain the loss of heat by the gases of combustion, the analyses of the latter must be given. Let it be assumed that they contain k per cent of carbonic acid, d per cent of carbonic oxide, m per cent of methane (CH_4), and r per cent of carbon in the form of soot. In every cubic meter of carbonic oxide, carbonic acid, and methane, there is 0·5395 kilogram of carbon; therefore, one cubic meter of a mixture of these gases contains:

$$\left(\frac{k + d + m}{100}\right) 0{\cdot}5395 + r = A.$$

Calling this expression A, then one kilogram of coal will yield:

$\frac{C}{A} = G$ cubic meters of dry gases passing up the chimney. In these gases, there are $\frac{G \times k}{100}$ cubic meters of carbonic acid, $\frac{G \times d}{100}$ cubic meters of carbonic oxide, $\frac{G \times m}{100}$ cubic meters of methane, $\frac{G \times h}{100}$ cubic meters of hydrogen, $\frac{G \times o}{100}$ cubic meters of oxygen, and $\frac{G \times n}{100}$ cubic meters of nitrogen. The specific heat for one cubic meter of the different gases is:

Carbonic acid	138·9
Oxygen	93·3
Nitrogen	91·9
Sulphurous acid	133·4

By multiplying these values with the quantity of gas in cubic meters and with the excess of the temperature possessed by the chimney gases over and above that of the boiler-house, the loss of heat by this source will be found.

There is also contained in the gases aqueous vapor resulting from the combustion of the hydrogen in the coal, which will produce 9 times its weight of water. At 100 degrees Centigrade, this quantity of aqueous vapor contains 637 times the product of calories of heat, and for every degree and kilogram of hydrogen must be added to this 0·475 calorie, so that the total loss of heat from this source may be found.

A third source of loss is the unburnt combustible constituents, carbonic oxide, methane, and hydrogen. Making deductions for the specific heat of the aqueous vapor formed by the combustion of hydrogen and methane, the calorific value of these gases per cubic meter is as follows:

Carbonic oxide	3058 calories.
Methane	8514 "
Hydrogen	2580 "

The determination of the loss of heat through the ashes is found by multiplying the grains of combustible fuel in the ash per kilogram of coal burned by 808.

Bunte gives an example of Ruhr coal containing:

Carbon	81·60 per cent.
Hydrogen	4·21 "
Oxygen	5·48 "
Ash	6·04 "
Water	2·69 "

This coal was burned so carefully that the gases showed by analyses the following composition:

Carbonic acid	6·12 p. c. by volume.
Carbonic oxide	0·89 " "
Hydrogen	0·10 " "
Oxygen	14·21 " "
Nitrogen	78·68 " "

The losses in this case were distributed as follows:

Specific heat of gases	1,492 calories.
Specific heat of aqueous vapor	283 "
Unburnt combustible substances	647 "
Loss in ash	331 "
Total loss	2,753 "

The total heat development of the coal per kilogram, as determined in this case by elaborate calorific experiment, was 8037 heat units, thus showing a loss of 34·25 per cent, the excess of temperature of the chimney gases over mean temperature of boiler-house being 224 degrees Centigrade, and the quantity of fuel burned per square meter of grate surface per hour being 54·5 kilograms.—*Coal.*

FUEL-GAS COMPANY.—Another fuel-gas company, composed of Chicago, Pittsburg, and Westmoreland County capitalists, has been formed. Colonel Archibald Blakeley, its representative, has secured twenty charters for supplying the greater portion of Westmoreland, Indiana, and Armstrong counties with natural gas. The capital stock is $1,000,000, and the company has purchased 2000 acres of land along the Kiskiminetas River, and also controls one of the Murraysville gas-wells. The object of the company is to supply Scottdale, Mount Pleasant, Irwin, and other towns in the vicinity with the natural gas, and it is expected that the company will be in active operation by the close of the winter. It is composed of Milton Weston, Judge John C. Polly, William H. Mechling, and Jonas Mechling, of Chicago; A. M. Sloan, Dr. J. S. Crawford, and Messrs. Johnston and Wallace, of Greensburg; and Colonel Blakeley, of Pittsburg. The company will begin operations shortly near McKeesport.

THE CHECK-WEIGHMAN LAW.—The law compelling the use of cars of a uniform capacity in all bituminous coal mines, the branding of all cars within three months' service, and the employment of a check-weighman, went into effect in Pennsylvania, on the 15th of September. The law regarding the latter is as follows: "The check-weighman shall not be considered a trespasser during working hours while attending to the interest of his employers, and in no manner shall he be interfered with or intimidated by any person, agent, owner, or miner; and any person violating these provisions shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than $20 and not exceeding $100, or imprisonment at the discretion of the court. Should any weighman or weighmen or check-measurer, whether employed by operators or miners, knowingly or willfully adopt, or take more or less than 76 pounds for a bushel or 2000 pounds for a ton, or willfully neglect the balancing or examining of the scales or cars, or knowingly or willfully weigh coal with an incorrect scale, he or they shall be guilty of a misdemeanor, and upon conviction thereof shall be imprisoned in the county jail for three months."

THE GASKILL PUMPING-ENGINE AT SARATOGA, N. Y.

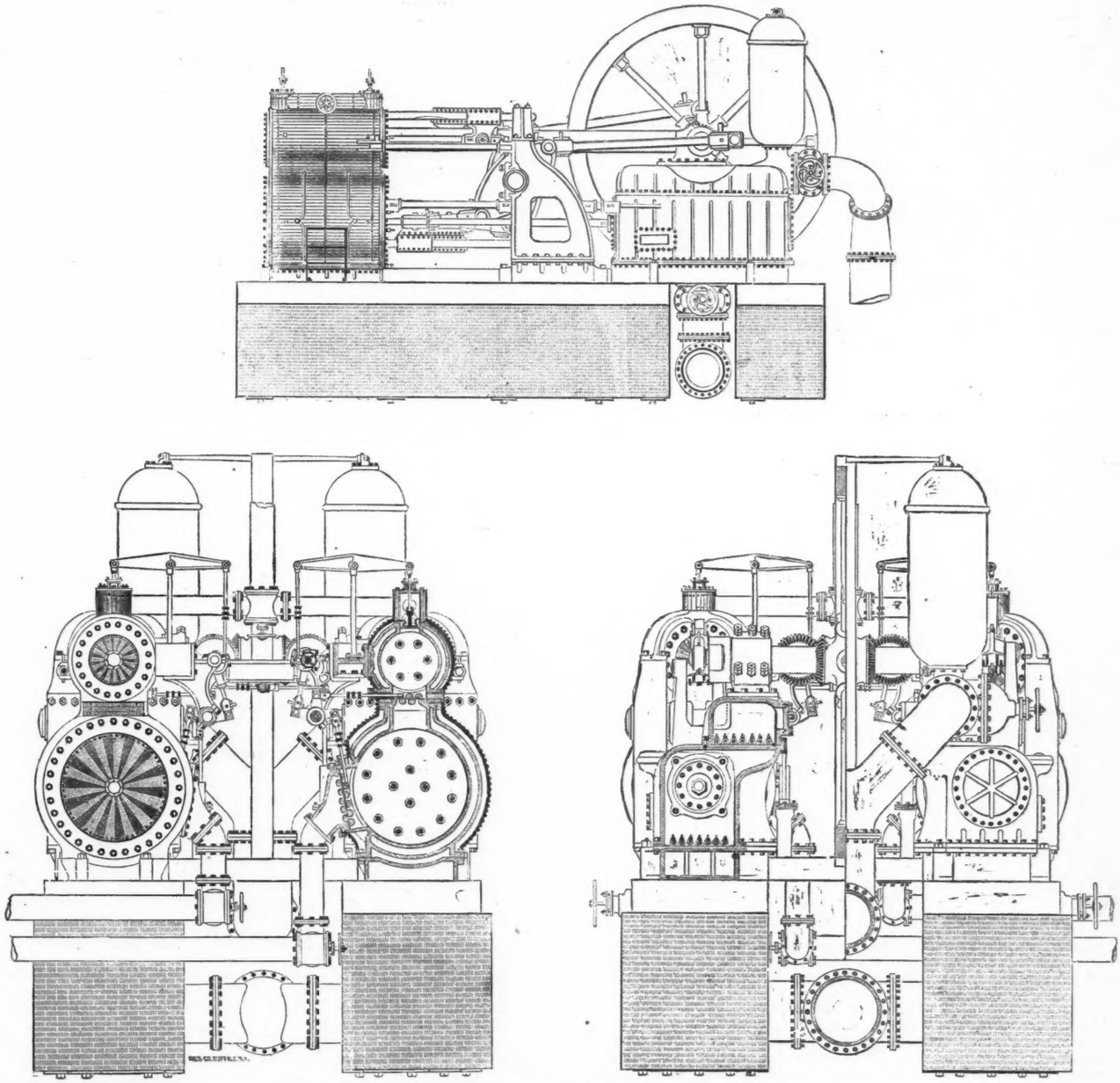
The exceptional record of the Gaskill pumping-engine at the Saratoga Water-Works has attracted much attention, being the first built after the latest design. It has been the subject of two interesting reports, one by Mr. John W. Hill, M.E., who comments on the results in a paper contributed to the October number of Van Nostrand's *Engineering Magazine*, and the other by Mr. Charles T. Porter.

The engines which we illustrate in the accompanying engravings are horizontal compound, of the type designed by Mr. H. F. Gaskill, of the Holly Manufacturing Company, Lockport, N. Y. Mr. Porter describes the engines as follows:

Each high-pressure cylinder is placed on top of a low-pressure cylinder, in the manner shown in our engravings, the object being to obtain a direct and short passage for the steam from the first to the second at each end, and thus avoid the waste of steam of the usual long passages, in compound engines, between the high and low-pressure cylinders. This arrangement requires the pistons of the two cylinders to move in opposite directions, the pressure of steam upon the pistons of each pair being transmitted to the flanges of their pumps in the following manner: The latter is set in line with the low-pressure cylinder, and so receives the thrust produced by the pressure of that cylinder directly. The low-pressure piston is provided with two rods, which are extended to the length of ten feet to the cross-head by which they are connected with the rod of the pump-plunger. Midway in their length, another cross-head is secured upon them, which runs on a guide. The rod from the high-pressure cylinder is keyed into a cross-head corresponding to this. The connection between these cross-heads is made by means of a short vertical beam and connecting-links, through which also the force exerted in the high-pressure cylinder is transmitted. A shaft carrying a fly-wheel revolves on bearings which are set upon the delivery-chambers of the two pumps. The two engines are connected through this shaft by means of cranks set on each end of it, at right angles with each other, and connecting-rods from these cranks to the upper ends of the beams. The cranks determine the length of the stroke, control the movements of the pistons and plungers, maintaining those of the two engines and pumps in a constant relation with each other, and give motion to the valve-gear.

The steam is admitted to the high-pressure cylinders by double-seated poppet-valves. A cut-off mechanism is introduced into the motion of these valves, which is adjustable to cut the steam off at any point in the length of the stroke. The point of cut-off may be fixed by hand, or by the action of the governor when the latter is thrown into gear. The governor is constructed to be operated by changes in the pressure of water in the delivery main, and acts to correct these changes by varying the point of cut-off, and thus the speed of the engine, in accordance with the variations in the demand for water. The communicating valves between the high and low-pressure cylinders and the exhaust-valves are gridiron slides. All the valves are driven by eccentrics, mounted upon two longitudinal shafts turning in bearings sprung from the inner sides of the high-pressure cylinders. These shafts are driven by miter-wheels from the main shaft.

All the cylinders and their heads are steam-jacketed. The water formed by condensation in the jackets is returned to the boilers in the following manner: The jackets blow directly into a small heater. The



THE GASKILL PUMPING-ENGINE AT SARATOGA, N. Y.

feed-water is conducted through this heater in a two-inch coil-pipe. A separate pump receives its supply from the bottom of this heater, and sends the hot water forward to unite in the feed-pipe with the new water, which has been already partially warmed in passing through the coil in the heater. This is a restoration to the boilers of that portion of the heat supplied by them to the jackets which had not been imparted from the jackets to the steam in the cylinders. The restoration is effected very well, except that the stuffing-box of the pump has no special provision for retaining hot water, and leaks sufficiently to make an appreciable loss.

There is no provision for preventing steam from blowing along with the water from the jackets into the heater. A valve was put into the drain-pipe, by partially closing which the full pressure was maintained in the jackets, and only a pressure of about twenty pounds was allowed in the heater. This was all that the situation admitted of, and it could not be known how much steam passed with the condensed water into the heater. Had it been practicable to attach an apparatus by which all the steam would have been kept back, and only the condensed water been allowed to pass, it would then have been easy, as it was desirable, by taking the temperature of the feed-water as it entered the boilers, to have known, very nearly at least, the quantity of steam condensed in the jackets. Since, however, the coil feed-water pipe in the heater acted as a surface condenser, and it was impossible to determine how much steam from the jackets was condensed by it, it seemed idle to take this temperature, which would rather lead to confusion than give any information.

The knowledge of the amount of heat imparted by the jackets would alone, however, give an exaggerated idea of the gain from their use, since there can be no doubt that they are most efficient in evaporating moisture contained in the steam at the time when it is passing directly into the condenser. The only satisfactory mode of determining the amount of the gain would be by a comparison of the results of this trial with those of another one, conducted with equal care, in which the steam was entirely shut off from the jackets.

The following are the principal dimensions :

Stroke of all cylinders	36 inches.
Diameter high-pressure cylinders	21 "
" " " piston-rods	3 "
" low " cylinders	42 "
" " " piston-rods	3·5 "
Clearance high " cyliuder	2·35 per cent.
" low " "	2·50 "
Diameter of fly-wheel	12 33 feet.
Weight " "	12,000 lbs.
Diameter of main shaft	10 inches.

These are horizontal double-acting plunger-pumps, the plunger working through a diaphragm separating the two chambers, and are constructed on the multiple-valve system. Their dimensions and performance are given in the following table.

During the test for duty and a part of the fire pressure test, their speed very much exceeded that required to supply the demand for water. The excess of water delivered was got rid of partly by opening hydrants and partly through the relief-valve.

The pressure in the supply-chambers was got by the indicator, with a spring showing twelve pounds to the inch. The pencil described the figure shown in a diagram which affords an interesting exhibition of the changes in the pressure as momentum is imparted or arrested in the current of water. The mean pressure, when corrected for elevation, was found to be one and one quarter pounds on the square inch at the center of the plungers, showing the level of the water from which the supply is drawn to be about thirty-four inches above this point.

It is to be observed, relatively to the fluctuations of pressure, both in the supply-chamber and in the delivery main, and also relatively to the motion of the plungers while the valves are closing, that in these pumps this motion, with that of the pistons, is controlled by the cranks, precisely as if it was transmitted through them. The valves are assumed to close only as fast as gravity would cause them to fall, although without doubt the reverse current brings them to their seats more quickly than this. But even on this assumption, the slip is no more than four tenths of one per cent.

The pumps are provided with by-pass pipes and valves, forming, when the latter are open, a communication between the two chambers of each pump. Their function is this : At the instant of starting, the engines are able to exert only a portion of their power, because no steam has yet been admitted to the low-pressure cylinders. The pressure of water is liable to be greater than the steam in the high-pressure cylinders alone can overcome.

In such a case, the by-pass valves can be opened, when the water flows through them into the opposite chambers, the pressure on the opposite ends of the plungers is in a measure equalized, and the engine is enabled to start. As soon as it is fairly in motion, these valves are closed.

They are available, also, when the motion of the engines required to supply the demand for water would be so slow that, on account of the insufficiency of the fly-wheel, it could not be maintained with the desired regularity, or perhaps not at all. Then, by partially opening these valves, the engines are enabled to run faster, and so to maintain their motion satisfactorily, the excess of water displaced by the plungers passing through them into the chambers that are filling.

The principal dimensions of the pumps are :

Aggregate length of the two chambers in each pump	7 feet 6 inches.
" width " " " " "	2 feet 3 inches.
" hight " " " " "	2 feet 11 inches.
Capacity of each pump-chamber, in cubic feet	25
Diameter of plunger, inches	20
" " rod	4
Area of plunger, mean of two faces, square inches	307·88
Stroke of plunger, inches	36
Displacement of plunger, in cubic feet	6·41417
" " " in gallons	48

The two boilers furnishing steam are of the horizontal return tubular type, the following being the principal dimensions :

Diameter	66 inches.
Length	18 feet.
Number of tubes in each boiler	87
External diameter of tubes	3 inches.
Arrangement of tubes : horizontal and vertical rows	
Least distance between tubes and shell of boiler	4·5 inches.
Hight of crown of boiler above tubes	24 inches.
Heating surface in both boilers, as follows :	
One half the shells, 311 ; tubes, 2460. Total	2771 sq. feet.
Furnace, width	6 feet.
" depth	5·75 feet.
" length of opening between grate-bars	5 feet.
" " these openings uncovered	4·25 feet.
" width of each grate-bar	1·75 inches.
" width of air spaces	·5 inches.
" square feet of grate area, under both boilers	51·00
" of which the proportion in air space is only	·22
Horizontal flues, as follows :	
Three times the length of each boiler 54 feet	
From wall between boilers to chimneys 24 "	
Total	78 feet.
Internal diameter of common flue and chimney	3 "
Hight of chimney above flue	75 "
Square feet of heating surface for each one square foot of grate area	54·3
Square feet of heating surface for each indicated horse-power	14·9

Mr. Porter reports the following results of a test of forty-eight hours.

Boilers.

Coal burned	16,860 lbs.
" " per hour, on each one square foot of grate.	6·9 lbs.
Water evaporated	155,961 "
" " by combustion of one pound of coal	9·25 lbs.
Average temperature of feed-water	71·5 deg.
" pressure of steam, by gauge	73·66 lbs.
Number of thermal units contained in one pound of steam	1211·1
Equivalent evaporation from 212 degrees, under one atmosphere	10·916 lbs.
Evaporation per hour from each one square foot of heating surface	1·175 "

Engines.

Average number of revolutions made per minute	19·370
Average piston speed, in feet	116·220
Pressure of the atmosphere, in pounds on the square inch	14·560
Average horse-powers exerted in high-pressure cylinders	109·200
" " " " " low " "	76 550
" " " " total	185 750
Pounds of coal burned per hour	351·00
" " " " horse-power per hour	1·89
Pounds of water evaporated per hour	3250·000
" " " " horse-power per hour	17·500
" " " " hour for each horse-power exerted in the high-pressure cylinders	30·000
Total average back-pressure in high-pressure cylinders, pounds.	12 500
Pounds of water per hour accounted for by indicator :	
1st. At point of cut-off in high-pressure cylinders	2061·000
Proportion of the quantity evaporated	·634
2d. At point of release in low-pressure cylinders	2880·000
Proportion of the quantity evaporated	·886
Temperature of the steam in all jackets, degrees	318·700
" " high-pressure exhaust (average)	204·000
" " low " "	153·000

Pumps.

Number of double strokes of each plunger per minute	19·3700
Mean velocity of plunger, in feet, per minute	116 4200
Number of valves acting together	84·0000
Diameter of each valve-opening, inches	1·3125
Total area opened by valves, square inches	113·6 00
Lift of each valve, inches	·3125
Mean velocity of water through valves, in feet, per second	5·2500
Weight of each valve, pounds	·5625
" " " " for each one square inch of opening. pounds	·4160
Resistance to current on each one square inch of opening. pounds	·2600
Total loss of efficiency in pounds on square inch. $(\cdot416+\cdot26)\times 2 = 1\cdot3520$	
Mean excess of pressure in the delivery main. pounds on square inch	84·5700
Proportion of power lost in passage through valves	·0160
Time occupied by valves in closing, seconds	·0400
Motion of plunger while valves are closing, inches	·0700
Proportion of stroke lost in closing of both admission and delivery valves	·0040
Net delivery from both pumps per double stroke, gallons	190·0000
Net delivery from both pumps per double stroke, pounds	1584·0000
Delivery per day at eighteen revolutions per minute, gallons	4,924,800·0000
Number of double strokes made in 48-hour test	55,779·0000
Net foot-pounds of work done on each double stroke	309,338·0000
" " " " " " by consumption of 100 pounds of coal	102,340,000·0000

In a duty trial extending over twenty-four hours, Mr. Hill gathered the following data :

In the following table are recapitulated the averages of all data and totals for duty trial :

Duration of trial, hours	20
Average pressure by engine gauge, pounds	74·25
Average vacuum, inches	27·295
Average temperature of injection, Fahr	56·225
Average temperature of overflow, Fahr	71·125
Average temperature of feed-water to boilers	169·175
Average pressure by gauge on force-main, pounds	95·06875
Difference of levels, center of pressure-gauge and source of supply, pounds	0·09965
Revolutions in twenty hours	21,449
Revolutions per minute	17·8742
Piston speed per minute, feet	107·2452
Total coal burned, pounds	6,750
Calculated discharge of pumps per revolution, gallons	191 923
Actual estimated discharge of pumps per revolution, gallons	187·125
Weight of water per gallon at 56 Fahr., pounds	8·33
Contract delivery at 18 revolutions, gallons	4,000,000
Actual estimated delivery at 18 revolutions, gallons	4,850,280
Excess over contractor's guarantee, per cent	21·257
Contract duty per 100 pounds coal	80,000,000
Conventional duty as per trial	112,899,983 104
Excess over contractor's guarantee, per cent	41·125
Net absolute duty, as per trial	108,793,535·3
Excess over contractor's guarantee, per cent	36

The following are the totals and averages of a daily report made by

David L. Holland, engineer of the water-works, for the week ended September 8th:

Total revolutions—6 A.M. to 6 P.M.	50,060	
" " —6 P.M. to 6 A.M.	37 460	
" "	87,520	
Coal burned from 6 A.M. to 6 P.M.	18,000	lbs.
" " " 6 P.M. to 6 A.M.	17,200	"
Total coal	35,200	"
Average water pressure	113	"
" steam pressure.	70	"
" vacuum	28 1	"
Total gallons pumped	16,716,270	
Average duty	103 040 851	
Maximum duty	106,413,967	
Minimum duty	100,448,140	

Mr. Porter speaks in the highest terms of approval of the workmanship of the machinery. He, however, expresses the opinion that the fly-wheel is insufficient, and believes that the fluctuations of pressure, which do not appear to exceed five pounds, could be reduced by using a fly-wheel eighteen feet in diameter. He advocates, also, in order to prevent in a greater degree the transfer of heat from the steam in the steam-pipe to the condenser without doing work, the employment of higher piston speed or moderate superheating of the steam.

DIAMOND MINING IN THE PROVINCE OF MINAS-GERAES, BRAZIL.—II.

The region in the vicinity of Diamantina forms a vast plateau through which a great number of rivers pass in deep cañons. The diamonds, which seem to come from the chains of mountains beyond the plateau, might therefore have been spread over another surface at the time the rivers were at the same level. Those which have been thus deposited on that part of the ground not removed by later erosion have remained, and this may be the origin of those deposits which are now found at great altitudes. In any case, all the deposits thus found in the beds of the rivers, as well as those on the banks or on the plateaus, are alluvial. Of all the rivers in the region, the most important and the richest is the Jequitinhonha, at least in its upper portion. The tributaries of this Jequitinhonha River from the right are very poor, while those entering from the left bank are very rich; for instance, the Rio Caéthémerim, the Rio Pinturo, and particularly Ribeirao-de-Enferno. These have their source in the chain of mountains alluded to. This fact gives strong evidence that the diamonds found to-day come from this chain above the plateau of Diamantina, and this leads me, says M. de Bovet, to allude to a special deposit, the only one of its kind, so far as I know, which does not possess any of the characteristics of an alluvial deposit. At S. Jean-de-Chapada, one of the highest points of the chain, diamonds have been extracted from layers of argillaceous schist interstratified with quartzite. These shales are distinctly stratified, and seem without any doubt to be in place, being produced by the decomposition of schists. Formerly, there were at this point extensive workings, now abandoned. There is an open cut more than 130 feet deep at some points, in which there are two small springs, one of them the source of the Rio Duro, and the other of the Rio S. Joao. A study of the topography leads me to believe that this deposit was a lenticular body in beds of quartzite. I have seen the shale taken out in my presence, and, after washing, it gave some diamonds, and with them were the same minerals which accompany the diamonds in the gravel, though not rounded, and in very much smaller quantity. This is natural, as it came from the deposit in place, and therefore had not been submitted to any natural mechanical separation. It seems that this is an original deposit, from which the diamonds were derived. It may be noted that at Grao Mogol, diamonds have been found in quartzite beds; but with the exception of the San Joao shales and the Grao Mogol quartzite, the diamond has never been taken from workings in other than alluvial deposits.

THE EXTRACTION OF THE DIAMOND.

So far as can be judged from the traditions which have come down to us as to the method employed in working the river-beds in former times, it does not seem that any notable progress has been made since then, except that pumps have been introduced. To-day, as it was then, the diamonds are extracted by hand. The river workings can not be opened without diverting the river from its bed, which is generally done by allowing it to pass into a canal. This canal is constructed, whenever possible, on one of the banks, by building a dam of rock; but generally, for its greatest length, it must be made of planks and carried on trestles.

When the point at which the workings are to be made has been chosen, the river is dammed above and below, and it is between the two dams that the work is done. At Diamantina, these dams are generally very well constructed. The workings are pumped dry by pumps driven by means of undershot wheels placed in the canal itself. The top sand is removed entirely by hand by means of flat scoops, carrying about thirty pounds, which a man places on his head and dumps into the canal. When the sands have been removed and the layer of rocks has been reached, the rock is blasted with powder and the small pieces are carried off in the same way. At Acaba Mundo, about 280 men were at work. Eighteen filled the scoops, which some 260 were employed in carrying off, so that, during a day's work of ten hours, about twelve hundred tons were removed, being lifted from twenty to twenty-five feet, and carried away a distance of from two hundred to two hundred and fifty feet.

The workmen are almost all of them negroes and slaves. They are divided into three or four gangs. The first one who reaches the canal dumps his sand, and then does not stir until the last one of the gang has done the same thing. All of them sing two or three verses of some negro song, and then rush back to the workings, where they have their scoops reloaded. This may be very picturesque, but it is very slow work, and very extravagant. The figures given above refer to work in the beginning when the diggings are not yet extensive, and the men do not get in one another's way; but as the pit deepens, the large number of men disturb one another, and they must form a chain along which the scoops are passed. This, of course, reduces the effective work considerably. All this labor is done in a country from which all the timber has been cut, and where the soil is exclusively sand, which does not retain the water, so that the slightest rain increases the volume of water in the river very much. As soon as the rainy season begins and the first storm has come, all of the dams are carried away, and in a few days the excavations made during the dry season are filled up. The dry and the wet seasons are fortunately very distinctly separated; and as soon as the latter has ceased, four months may be counted upon, from the middle of May to the middle of August, during which not a drop of rain falls. During this very short period, and with manual labor, it is evident that no great stretch of the river-bed can be worked, and that the extent of a working is still more restricted when the gravel must be sought at a great depth. The miners at Diamantina believe a depth of eighty feet to be the limit which they can reach. Those portions of the canal which are made of timber are always removed prior to the beginning of the rainy season.

TREATMENT OF THE GRAVEL.

As the nature of the workings in the river-bed is such that work must go on as rapidly as possible until the day when it is believed prudent to remove the canal, no attention whatever is paid during the dry season to getting the diamonds. All that is done is to remove to a place of safety the greatest possible quantity of the diamond gravel. When the gravel contains clay, it is first puddled in a shallow basin. The workmen walk about in it and agitate it with hoes, the water carrying off the fine mud. The rest goes to the washer. This is a small basin, about three feet square, one end being open, while the other and the sides are from twelve to sixteen inches deep. The bottom is slightly inclined toward the open end. Immediately below is a second basin full of water, in which the workman stands knee-deep. When the gravel has been placed in the upper basin, the workman takes up water with a scoop, and throws it against the gravel. Thus the lighter sands are carried off. The larger pieces are removed by hand. The rest is washed in a pan. This must be done very slowly by skilled men. The diamond is not found at the bottom of the pan, as gold is. On the contrary, it appears on the surface. After having agitated by a peculiar movement the sand on which he is working, the washer slowly allows the excess of water to flow off, and at a glance sees the diamond which he has brought to the surface. Sometimes, white sand is mixed with the gravel, in order to enable the washer to see the diamond more distinctly. It is not probable that this part of the process can be replaced by any mechanical contrivance.

THE STRENGTH OF WROUGHT-IRON STRUTS.

At a meeting of the American Society of Civil Engineers, a paper by Mr. James Christie was read on Experiments on the Strength of Wrought-Iron Struts. These experiments were made at the Pencoyd Iron-Works, for the purpose of determining the comparative resistances to compression of long and short struts of rolled angles, tees, beams, and channel sections. The specimens were tested by four different methods, namely, with flat ends between parallel plates, to which the specimen was in no way connected; with fixed ends, or ends rigidly clamped to parallel plates, the plates substantially forming flanges to the specimen; with hinged ends, or both ends fitted to hemispherical balls and sockets or cylindrical pins; with round ends, or both ends fitted to balls resting on flat plates. The specimens varied in length from six inches up to 16 feet, and were selected to obtain a uniform character of material. The paper gave tabulated results of 299 experiments, and these results are illustrated by a number of diagrams. There were also results given of a number of tests of welded tubes. The general conclusions drawn from these experiments were as follows ($\frac{l}{r}$ being length divided by least radius of gyration): When struts are short, say $\frac{l}{r}$ below 20, there will be no practical difference in the strength of the four classes, so long as reasonable care is taken to keep the center of pressure in the center of the strut. Hinged-ended struts vary all the way from round-ended up to flat-ended in strength. If the hinges are pins of substantial diameter, well fitted, and exactly coincident with the axis of greatest resistance of the strut, the strength of the strut will be fully equal to that of a flat-ended, but, considering the impracticability of maintaining this rigid accuracy, the average hinged struts as compared with flat-ended will fall in strength as the length is increased until $\frac{l}{r}$ is about 250, when they will average one third less resistance than flat-ended. From this point, they will gain comparatively until $\frac{l}{r}$ becomes about 500, when both classes will be practically equal. Fixed-ended struts gain in comparative resistance, from the shortest lengths upward, until $\frac{l}{r}$ becomes about 500, when they are twice as strong as either the flat or hinged-ended.

Round-ended struts continually lose in comparative resistance as the length is increased. When $\frac{l}{r}$ is above 340, they will be half as strong as hinged-ended, and when $\frac{l}{r}$ is above 160, they will have only half the strength of flat-ended.

The iron from which the tests were made exhibited the following resistances to direct compression, being the general results of several tests of small section, fifteen inches long, and secured in such a manner as to prevent lateral flexure:

With 30,000 pounds pressure per square inch, incipient permanent reduction of length was observed. With 35,000 pounds pressure per square inch, failure of elasticity occurred, and marked permanent reduction of length. With 50,000 pounds per square inch, a permanent reduction of length of three per cent occurred. With 75,000 pounds, a permanent reduction of ten per cent; and with 100,000 pounds pressure per square inch, a permanent reduction of twenty-eight per cent of the length.

The paper was discussed by Messrs. Theodore Cooper and Charles E. Emery, who both expressed the opinion that these experiments were of very great value, being made with material of uniform character, and in such a way that comparisons could be made directly between the different methods adopted in testing.

FURNACE, MILL, AND FACTORY.

The Lidgerwood Manufacturing Company, No. 96 Liberty street, New York, manufacturers of hoisting machinery, has determined to be represented in Baltimore, and hence has placed an agency for its goods with Messrs. Morton, Reed & Co., who are favorably known to the trade of the North and South.

The Crane Brothers Manufacturing Company, of Chicago, is building for the Charlotte Iron-Works, Rochester, N. Y., a complete blast-furnace hoist containing some new improvements. The machinery department of the works is running full.

Eckert's furnace, No. 1, at Reading, has chilled, and during the past few days and nights a force of men has been vainly trying to break up the solid mass within. Chipping and prying have been almost useless, so hard has it become, and several blacksmiths are kept busy sharpening tools. The furnace is 57 feet high, and now contains 38 feet of chilled material. It will require several months before it is again in running order. The remaining furnace has been idle also, but is now blown in.

The Lechner Manufacturing Company, Columbus, O., manufacturer of elevating and conveying machinery and roller detachable chain belting, has made a shipment of a chain elevator to the New York City Plate Glass Company, at Tarentum, Pa., to be used for elevating sand; and has also furnished S. J. Meeker, Newark, N. J., with roller chain belting, etc. In addition to this, it has furnished the Columbus & Hocking Coal and Iron Company, Columbus, O., with another chain elevator for its mine at Longstreet, Ohio, for elevating coal.

The articles of association of the Chartiers Iron and Steel Company, Limited, have been placed on file in the recorder's office at Pittsburg. The capital is $60,000, and has been paid in as follows: John C. Kirkpatrick, $25,000; David A. Carter, $12,500; Barker C. Wilson, $12,500; and John Henry, $10,000. The officers are: J. C. Kirkpatrick, Chairman; D. A. Carter, Secretary; and B. C. Wilson, Treasurer.

The Indianapolis *News* of the 20th ult. reports as follows: The new steel rail mill ran through several blooms yesterday, having begun operations again the day before. The machinery worked so well, and all the operations promised to be so economical, that Secretary Jones told the reporter that it was not improbable that the company would make contracts for a regular supply of blooms, and continue in operation permanently. Not much could be made at it at the present prices of steel rails, but he was so well satisfied that the work could be done so much more cheaply by their improved processes than other mills could do it that there would at least be no loss. Since the last notice in the *News* of the operations of this great enterprise, Mr. Lentz has added some minor improvements that help the automatic work considerably. One of these is a combination of levers or lifters that turn the hot bloom on the hooker rollers, as they raise it to the upper rolls. This saves some trouble and uncertainty about getting the bloom into proper position to pass through the rolls. The two 1300-pound blooms which the reporter saw rolled out into 60-foot rails met with but two or three slight hitches from the roughing rolls to the saw, and the worst of these was the result of an oversight that was soon remedied.

The guide mill, connected with the Portland Rolling-Mills, at Portland, Me., was burned October 9th.

A dispatch from Cleveland says that the scheme of reorganizing Brown, Bonnell & Co., the iron-works company of Youngstown, has failed, and an effort is making to form a new company, with a capital stock of $1,200,000, and to assume all the assets and liabilities of the old company.

The new water-jacket furnace at Reading, Pa., owned by Henry S. Eckert, has been in blast about one week, and up to this time the result has been very satisfactory: thirty tons of iron are made daily, but it can be increased to forty. This is said to be the only furnace of the kind in the United States. The jacket surrounds the furnace to the hight of 19 feet 9 inches; it is made in sections, so that if an accident should occur to either section, it could be replaced. Between the outer and inner plates of the upper section, is a thickness of five inches of water, and in the lower section, four inches. The fresh water is constantly running in above, and is allowed to flow off below through pipes.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Edgar B. Salsig *et al.*, Forty-nine lode. Dana Harmon, Bradford, Salvation, and Delta lodes. Morning Star Extension Mining Company, Extension of the Morning Star lode.

CALIFORNIA.

THE BODIE DISTRICT.

A. R. Conklin *et al.*, Summit No. 2 lode. Bodie Consolidated Mining Company *et al.*, Prince, Granger, Gildea, Edith, Bodie, Lucky Jack, and Molly lodes.

MARYSVILLE DISTRICT.

C. E. Kusel, Elmwood placer.

SACRAMENTO DISTRICT.

Giacomo Giacomella, placer. Henry Christiensen *et al.*, New Schleswig placer mine.

SHASTA DISTRICT.

Martin Ford, Hudson Bay mine quartz mine. W. J. Hupp *et al.*, Five Cent Gulch placer.

COLORADO.

CENTRAL CITY DISTRICT.

Conasa Silver Mining Company, A. B. Robbins and Hope lodes. Lebanon Mining Company, Tom Ollire lode and mill-site. Marcus W. Rasback, Crouse, Bobtail, and Boom lodes. Charles I. Dreifus, Cincinnati lode. Frederick Ware *et al.*, Candler placer mine. M. M. Chambers, Alpine lode. Edward Lowe *et al.*, Bob Emmet lode. Pitkin County Mining Company *et al.*, Carbonate Chief and Buckhorn No. 2 lodes.

DURANGO DISTRICT.

W. E. Webb *et al.*, Allie Davis, Moonstone, Hercules, and Red Rover lodes. I.X.L. Tunnel Company, Lucy lode. James B. Ross *et al.*, Sinbad lode. Sultan Mountain Silver Mining Company, Avalanche lode.

GUNNISON DISTRICT.

Finla McClure, Robert Wilson lode.

LAKE CITY DISTRICT.

Moline Silver Mining Company, Fire King lode.

LEADVILLE DISTRICT.

John H. Reed, Alicante lode. Charles Hawkes *et al.*, Tip Top lode. D. D. Belden, Bird, Little Chicago, Little Ella, and Louise lodes. B. F. Follett *et al.*, Batavia lode. New Haven Mining Company, Modoc lode. William T. Holt, Republic lode. Clayton K. Smith, coal.

DAKOTA.

DEADWOOD DISTRICT.

Moses S. Emery *et al.*, Katahdin lode.

IDAHO.

BOISE CITY DISTRICT.

Colman Mining Company, Colman and Oregon lodes.

MONTANA.

HELENA DISTRICT.

John McLaggan *et al.*, Samantha lode. Mary E. Higgins *et al.*, Kessler lode.

JEFFERSON DISTRICT.

William H. Hartman, Great Eastern lode.

NEW MEXICO.

LA MESILLA DISTRICT.

Plymouth Rock Mining Company, New Issue lode.

LAS CRUCES DISTRICT.

Ivanhoe Mining Company, Ivanhoe lode.

NEVADA.

CARSON CITY DISTRICT.

Auburn Consolidated Gold Mining Company, Auburn lode. General Jackson Mining Company, Trump quartz, Lightning quartz, and Silver quartz mines.

EUREKA DISTRICT.

A. P. Hegeman *et al.*, Harlem & Eureka Bell Consolidated lode.

OREGON.

LA GRANDE DISTRICT.

John W. Larkin, Boston quartz mine.

UTAH.

SALT LAKE DISTRICT.

Alonzo H. Earll, coal.

GENERAL MINING NEWS.

ARIZONA.

GILA COUNTY.

Miners at Pioneer have struck against a reduction of fifty cents a day. It is said that they will not permit any one to work for less wages than they received.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—The Longfellow and Metcalf claims, which, with Coronada and Copper Queen, are the principal properties of this company, are actively worked, and sundry improvements are in progress which will tend to the more economical working of the company's properties. Four new smelters are to be erected.

DETROIT COPPER COMPANY.—The company has four mines adjoining, and west of the Longfellow mine. The daily shipments of ore amount to between 50 and 60 tons, which yields an average of 25 per cent copper. The mines are worked by a series of tunnels, the ore being mainly stoped out from these tunnel levels. Two shafts have been sunk on the Copper Mountain mine, one of which, a main working-shaft, is down about 180 feet. The gangue of the ore in the Copper Mountain carries enough iron to flux the carbonate ores of the Arizona Central and Lower Yankie. The reduction-works of the company are at Morenci, on the Frisco River, some six miles distant from the mines. The company has two water-jacket furnaces—one Rankin & Brayton and one Fraser & Chalmers. But one furnace is blown in at a time, the other being kept in reserve in case of accident. The company contemplates at an early day putting in another furnace, and running two constantly. The average daily output of copper matte is at present between 9000 and 10,000 pounds. The copper matte is shipped to Ansonia, Conn., where it is refined and is sold in the market as the Anchor brand.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED.—Mr. W. Van Norden writes us that the company was organized June 1st, 1883, by the consolidation of several properties, and has paid dividends regularly each month. About two millions of dollars in gold have thus far been taken from the mine. The mine is down about 1400 feet, and has a large quantity of ore in sight, having four levels open, and each but little worked. The company has kept much ahead of its needs in development. The vein is from 20 to 54 feet in width, of mixed gray and white quartz—called "ribbon quartz"—and with a small percentage of sulphurets. The gold mills freely. The shaft is vertical, three compartment. There is steam-power to raise 500 tons per day. The mills are run by water, and have a capacity of 120 stamps. The rock runs from $14 to $16 a ton. The production is about $80,000 per month. One hundred and twenty stamps are running at times, and part of the time 80, until the water rises in the fall. The cost of plant, including stamps, was about $350,000.

MONO COUNTY—BODIE DISTRICT.

The Bodie *Free Press* says that the Noonday, North Noonday, and Red Cloud Consolidated mining companies, together with all real estate belonging to the companies respectively, will be sold at public auction on the premises by the assignee in insolvency, Irwin C. Stump, on Monday, November 19th, 1883.

BODIE CONSOLIDATED.—The official report for the week ended September 29th shows: Ore crushed, 164¼ tons; average assay value of pulp, $50.45; of tailings, $5.87.

STANDARD CONSOLIDATED.—The mill has resumed operations. The new engine, which takes the place of the old one, was built at the Union Iron-Works, in San Francisco, and is one of the best obtainable. It is of about 170 horse-power, and the cylinder is 20 by 36 inches. While the new engine was getting into place, the boilers were overhauled and placed in a condition for a protracted season of usefulness. It takes about seven cords of wood each twenty-four hours to keep up the fires in this twenty-stamp mill. Every thing is now in excellent order.

HOMER DISTRICT.

MAY LUNDY.—It is reported that this mine has passed into the hands of an English syndicate, which proposes to develop and work it to its fullest capacity. Heretofore, says the San Francisco *Stock Report*, it has been worked during the summer months only, and even then the ore was run down a 3000-foot tramway to Lake Cañon, and then hauled three miles on wagons to a rude ten-stamp mill. The mine has already shipped something over half a million dollars in gold, and the average yield has been a fraction over $50 to the ton. The ore is free milling. The English company contemplates a deep tunnel over 10,000 feet in length. Desiring to run through its own ground, and to reap the benefits of any discoveries resulting from its enterprise, it is understood that it has purchased, or is to purchase, all the properties along the line of the tunnel. This adit will pass 3000 feet vertically beneath the croppings of some of these properties. The lower levels of the mine make a far better showing, both as to quality and quantity of ore, than the upper workings. Three tunnels or adits have been run—the upper tunnel, 100 feet from the surface, following the vein 90 feet through the

crest of a cross-ridge; the second being 270 feet from the surface and 493 feet in length; and the third nearly 600 feet beneath the surface and 899 feet in length—all following the vein.

CANADA.

PROVINCE OF MANITOBA.

It is stated that some English capitalists are considering a proposal to invest largely in mining property in the Lake of the Woods section.

ONTARIO.

A number of American capitalists, according to recent reports, propose to form a company with sufficient capital to enable them to erect crushing and concentrating mills, with a view to the utilization of the waste phosphate rock which so rapidly accumulates about the Ottawa County mines. These gentlemen are the holders for Canada of the patent for Paddock's pneumatic ore separator, and they profess to be able to utilize all rock containing 75 per cent down to 20 per cent of phosphate, and by means of crushing and contracting to bring it up to 85 per cent standard.

ALBERTA.—This company has applied for supplementary letters patent increasing its capital stock from $50,000 to $2,000,000.

COLORADO.

ARAPAHOE COUNTY.

HARRIS.—At a meeting of directors recently held in Denver, it was decided to increase the capacity of the smelter to 150 tons of ore per day, the work to be completed within the next six months. During the interval, the present works wil be run to their fullest capacity, which is from fifteen to twenty-five tons per day.

GILPIN COUNTY.

CALIFORNIA.—The shaft is about 1600 feet deep, and sinking as rapidly as possible to gain a depth of 2000 feet. In the 1400-foot level, a body of ore was recently struck over eight feet solid pay, which is running an average of ten ounces of gold per cord under the stamps, and smelting ore, of which there is a large streak over $150 per ton. The last clean-up from the seventy-stamp mill running on this ore was over 300 ounces of fine gold.

WHITING.—The lessees have begun drifting east and west at a depth of 250 feet in the main shaft of that mine. Enough ore is raised to keep from five to ten stamps running. The mine is now more than paying current expenses in doing the development-work.

GUNNISON COUNTY.

EASTMAN & SHORT CONSOLIDATED.—The concentration-works at Tomichi were burned to the ground recently. The loss is reported to be from $35,000 to $40,000. No insurance.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY.—The Ute and Ulé keep up their regular production of about thirty tons per day. The principal work is done in the lower levels of the Ute, although some active development is going on in the Ulé. The concentrator at these mines is running in full blast, and is kept busy concentrating the Ute and Ulé ores, and the ores from several neighboring mines.

INDEPENDENCE.—Work is vigorously prosecuted, and the contract for 1000 tons with the Mingo Smelting Company will shortly be filled.

LAKE COUNTY.

The question of giving the Stamm gas smelting process a practical test at Leadville is again agitated with good prospects of success.

ARGENT.—The Vining mine, on Rock Hill, one of the properties of this company, is looking very well, having undergone great improvements. Recent work toward the southwest has carried developments beyond the unfavorable area, and there is now disclosed to view a quite regular ore-chute. The strength of the ore-body is demonstrated by a stope about seventy feet square, while the breast of ore shows for nearly an equal length, with a thickness ranging from one to five feet. The shipments average about six tons of ore a day, all of fine grade, which is sufficient to meet the expenses of the mine, and leave a surplus of from four to eight hundred dollars a month.

BROOKLAND.—The capital stock has been increased from $1,500,000 to $2,000,000.

CHRYSOLITE.—The lessees of the different portions of the old workings of the mine are working with varied results. The lessees of Muldoon shaft, situated on the north side of the head of East Seventh street, have abandoned the hope of finding mineral on the contact already pierced, and have resumed the sinking of the shaft. At present, the workings are in porphyry at a depth of 160 feet.

CUMMINGS & FINN.—The Grant Smelting Company has just purchased this smelter at Leadville. It is the largest smelter in the carbonate camp, having a capacity of about two hundred tons a day. The property is to be turned over to the Grant Company next month. The purchase is the result of the increasing mineral output of the State, and although the Grant works at Denver are treating 300 tons daily, yet the supply has been increasing rapidly on the company's hands, so that it became absolutely necessary either to enlarge the Denver works or buy or build additional works elsewhere.

EVENING STAR.—The company has nearly one hundred thousand dollars on hand, and no indebtedness. The pumping machinery for the upper shaft is all in place and paid for. The enlarging and retimbering of the shaft is completed within about one hundred feet of the surface, and will be finished in a fortnight. About two weeks more will be consumed in getting the pumps in working order, so that it is anticipated that by the first week in November the sinking of the shaft will again be in progress. The present depth of the shaft is 411 feet, and it is calculated to sink it to a depth of six hundred feet. At the McHarg shaft, the sinking of the sump to greater depth has been taken up. The cutting out of the station has disclosed the mineral vein, which has a thickness of about thirty-four inches of fine sand ore. Some of this mineral has been shipped to the smelter, and returned seventy per cent in lead and nineteen and a half ounces in silver to the ton. A drift will soon be commenced on the strike of the vein, and the extraction of ore will immediately follow. The ore-vein seems to be improving in strength and grade to the southward.

GLASS-PENDERY.—The property is shipping about twenty-five tons of ore a week. The mineral averages twenty per cent in lead, and contains from fifteen to twenty ounces in silver to the ton. The ore also carries a large percentage of iron, constituting it a most desirable ore.

HARRISON.—The works are increasing and improving by the addition of a large roasting-furnace, designed for desulphurizing the sulphide ores at present produced by a number of the mines in California gulch.

HIGHLAND CHIEF.—A meeting is to be held at Leadville shortly, to discuss the present condition of the company. It is evident, says the Leadville *Herald*, that the company can not pay interest or redeem its bonded indebtedness, and that the property will revert to the bondholders pro rata to the amount of bonds they possess. As the bonds expire at an early day, the prospects are, that the stock of the company will soon be valueless, and that the bonds alone will represent interest in the consolidated property. There is but a very small interest in shares out that is not represented by a corresponding amount of bonds. The indebtedness was incurred in working the property and supplying it with machinery and buildings, and afterward in unsuccessful exploration and development-work. The company possesses about twenty-five acres of promising territory, of which an area of only three fourths of an acre has been opened and thoroughly explored. Three shafts on other portions of the company's ground have been sunk to mineral, but no drifting has been done from any of them.

LEADVILLE CONSOLIDATED.—The mines of this company are said to be looking better than at any time during the past six months. During the month of September, a lot of ore of seventy tons was shipped from the Carbonate mine, averaging ninety-eight ounces to the ton. Another lot of about sixty tons is at the smelter, estimated to average one hundred ounces to the ton.

LITTLE JOHNNY.—Owing to litigation, this mine, situated on Breece Hill, was closed down for some months until within a few days, when work was again resumed. The first ore has been hoisted, and the mine will be in a position to ship from ten to twenty tons of ore a day.

LITTLE PITTSBURG.—The monthly expenses range from $8000 to $9000. The principal work in progress is carried on in the Dives and northern portion of the company's claims. The old workings of the mine are gleaned over by miners working on tribute. Included in the new work to be undertaken this month is the cleaning out of No. 10 shaft, and the extension of the drift to the northward on the west side line of the Little Pittsburg claim.

PARK COUNTY.

WESTON.—The company is building a mill at the mine in Mosquito Gulch, of sufficient capacity to accommodate the entire product.

WYANDOTTE.—Contracts have been let for a cross-cut tunnel at the base of the mountain, tapping the vein about 200 feet below the present workings.

PUEBLO COUNTY.

COLORADO COAL AND IRON COMPANY.—A dispatch to the Denver *Tribune* says that the first run of spiegeleisen was made at Bessemer recently, and eleven tons of this valuable material were turned out. A practical test of the new goods has been made in the converters. The home-made spiegel and iron worked to a nicety. The first run of steel rails from the new goods was a success.

SAGUACHE COUNTY.

BUCKHORN.—One of the most wonderful mineral discoveries on record, says the *Chronicle*, was made in this mine on Crystal Hill recently. In the process of developing the mine, caves were discovered varying from a foot to several feet in diameter and many feet in extent, possessing walls of solid, rich mineral.

SAN JUAN COUNTY.

SAMPSON.—The mill is almost completed and will be started up soon.

SUNNYSIDE EXTENSION.—An important strike has been made.

DAKOTA.

BATTLE CREEK GRAVEL MINING COMPANY.—The properties of this company have passed into the hands of Messrs. E. L. Sawyer, Daniel Ferguson, and Peter Johnson, subject to redemption by the company at any time within one year from the date of the sheriff's sale. Arrangements will be speedily made for extensive work. A large amount of gold has already been obtained, and it is alleged that plenty of money could have been made if it had been properly worked.

FAIRVIEW.—The mill has started up on gravel from the Hill claim, Blacktail Gulch.

FATHER DE SMET.—The superintendent reports for the week ended September 25th: At the mine, every thing is going ahead well without any drawbacks. Golden Gate south header shows no change, the face looking as well to-day as it did a month ago. We shall begin breaking out across the ledge soon and get it in shape for stoping. East cross-cut, 3d level, is now out about 69 feet, 43 feet having been run since the present work began. So far, we have cut through a ledge about 20 feet in thickness, which, I think, is part of the ore-body in Cook's chamber, 2d level. As soon at practicable, we shall open out both ways on it and get in shape for a stope. The quality is mixed somewhat, but I think it will average a little better than the ore now milled. The face of the cross-cut is now in slate, and I expect no change until it strikes the Golden Gate ledge. The mill is doing good work so far this run. For the week ended September 30th: Ore extracted from first level, 1000 tons; second level, 900 tons; third level, 845 tons. Ore milled, 2700 tons. Golden Gate east cross-cut, third level, is in 80 feet, and Golden Gate south header, second level, is in 50 feet. For the week ended October 1st: Ore extracted from first, second, and third levels, 2745 tons. Ore milled, 2700 tons. Golden Gate east cross-cut, third level, advanced 18 feet. Total length, 80 feet. Golden Gate south header, second level, advanced 8 feet. Header in 50 feet.

JULIA.—This company has filed articles of incorporation. It intends to develop the Julia and other mica mines in the Black Hills.

GEORGIA.

The supply of water has increased, and most of the mills at the mines in Lumpkin County have started up. The work of development at the mines continues with favorable results.

MEXICO.

From a letter, written by a correspondent of the Mexican *Financier*, from Pachuca, we learn that the Progreso hacienda is at last in full blast. It is reported that the Encino mine is to start to work at full blast very soon. The prospect, Alta Gracia mine, has got its large malacate all up and in running order, and the shaft is sinking.

The Pachuca River Concentrating Company's works shut down a few days ago for a couple of weeks, till the new machinery arrives. A sale of one hundred shares of this company's stock was reported the other day at the rate of $15 per share. The par value is five dollars, U. S. currency. At Santa Rosa, the Schley Mining Company, of New York, owns several splendid mines; the Ida, Robert E. Lee, Washington, New York, La Reina, Savannah No. 1, Savannah No. 2. Of these mines, the Ida, La Reina, Robert E. Lee, and both Savannahs are in paying ore, and these ores are not in pockets, but in true fissure-veins, which, when worked on a large scale, will pay very profitably. All that is now wanting in this district is a good reduction-mill, as the ores have now to be shipped eighteen miles to be reduced. The old Capula mine has eighteen different large lodes coming into it; but at present, it is lying idle. The Santa Teresa Company is a promising property, but badly handicapped, it is said, for want of funds.

MICHIGAN.

The product, of the mines mentioned, for the month of September, is as follows:

PORTAGE LAKE DISTRICT.

	Tons.
Atlantic	159
Calumet & Hecla	1,679
Franklin	188
Grand Portage	40
Pewabic	51
Hancock	37
Huron	58
Quincy	336
Wolverine	43
Peninsula	31

KEWEENAW DISTRICT.

Allouez	105

CALUMET GOLD AND SILVER MINING COMPANY.—The company is exploring on sections 21 and 29, town 48, range 47, which property lies to the north and northeast of the Ropes property.

ERIE.—Operations have entirely ceased, and it is rumored that a reorganization of the company will be effected. The cause of the trouble seems to be that not enough capital to work the mine properly was available.

HYDRAULIC POWER COMPANY.—The company was organized with a capital of $200,000. It has recently been increased to $300,000. The work done will cost $300,000, and when completed will effect a saving of $50,000 per annum to the Chapin and Ludington companies.

NORTHWESTERN.—Shipments are regularly made. The mine is supplied with adequate machinery, and bids fair to become a very large producer.

OHIO.—A depth of about 250 feet has been reached by the diamond drill at work on this tract, and it is expected to strike the ore-body shortly.

PITTSBURG & LAKE SUPERIOR.—A strike has been made about a quarter of a mile south of the Palmer mine workings. At a depth of 220 feet from the surface, the diamond drill encountered ore, and has passed through 22 feet of it. The ore is of a hard variety, and is said to be of excellent quality.

ROPES.—The experiments made have been so successful that the company intends to erect a forty-stamp mill.

MONTANA.

DEER LODGE COUNTY.

GRANITE MOUNTAIN.—The recent discoveries have been so favorable that the company has decided to work the mine on an extensive scale and erect a sixty-stamp mill next year. Until recently, the operations in the main tunnel, prosecuted at great expense for a thousand feet, were so unfavorable that they were on the point of stopping work.

SILVER LION.—This recent discovery has been bonded. About fifteen tons of ore are on the dump that will average about 200 ounces. This ore will be shipped to Denver for reduction.

TIDAL WAVE.—This mine is the oldest discovery in this district, and has been developed to a greater extent than any other. It is opened by two tunnels which have been tapped by a shaft, thus giving the mine a good ventilation. A large pocket or chamber was struck lately. The ore will average over 200 ounces to the ton.

MADISON COUNTY.

The erection of a twenty-ton smelter in Tidal Wave District has induced the owners of a number of claims to prosecute work vigorously.

BROADWAY.—Recent reports state that this property, through extravagant management, was put under a cloud about a year ago, but as soon as a few attachments now resting on it are raised, the mill and mine will again be started.

SILVER BOW COUNTY.

It is stated that the transportation of copper ore from Butte to Baltimore costs $40 per ton. Wood costs $6.50 per cord, and salt, of which enormous quantities are used in the mills in the process of separating, costs $5 per ton in Ogden, Utah, and the railroad charges are $25 per ton for transportation.

NEVADA.

ESMERALDA COUNTY.

NORTHERN BELLE.—Considerable fair-grade ore is obtained at a small expense from the sorting over of the waste-dumps. Five stamps of mill No. 2 are now engaged on custom ore, consequently but 23 tons of ore from the mine are delivered daily, that amount being amply sufficient for the other fifteen stamps.

EUREKA COUNTY.

EUREKA TUNNEL.—This company has been attached by F. W. Chite, of San Francisco, for $36,000, and by O. N. Hansen for $300. Suit was also begun against the company by the White Pine Bank of Eureka for $5391.

STOREY COUNTY—COMSTOCK LODE.

On September 28th, at a distance of about 21 feet, the Union west cross-cut had not reached the vein. There is a slight increase of quartz in the face. The last streak of quartz that was cut had swung around (together with the stratification) until it was parallel to the cross-cut. Whether the vein has swung with the cross-cut is the question which is at present puzzling the management and the holders of securities. The ground showed indications of water at one time, and the Burleigh drill was sent ahead until the ground became drier and the possibility of encountering a flow lessened.

IMPERIAL.—Work will soon begin in the old upper levels for the extraction of low-grade ore. There is probably in the Imperial, Alpha, and Exchequer a large amount of ore of about the same quality as that which the Crown Point, Yellow Jacket, Belcher, and Kentuck folks have been mining.

NEW MEXICO.

DONA ANA COUNTY.

At the annual meeting, held at Lake Valley recently, the following gentlemen were elected directors of the Sierra Grande, the same being chosen for the Sierra Bella and Sierra Apache: Edward D. Cope, Ellis H. Yarnall, R. Pearsall Smith, Stuart Wood, Robert C. Canby, David Bransoul, Charles H. Helman, G. G. Posey, F. M. Endlich. Messrs. Cope and Yarnall are the only members of the old board who hold over. The bulk of the proxies were held by a man named Bacon, who had been sent out by the Philadelphia stockholders. An impression prevails in this vicinity, says the Silver City *Southwest Sentinel*, that the Sierra properties can be made to pay a handsome interest upon the investment, even at the present high capitalization, and it is hoped that the new management will take the mines in hand and honestly strive to show what the ore contains.

SANTA FE COUNTY.

BONANZA No. 3.—Work will be resumed at this mine.

CASH ENTRY.—Since the property was purchased for $40,000 by the present owners, it has been worked in a straight and regular way. In connection with this mine, are a large number of prospects. The mine is developed by two shafts—No. 1, 160 feet deep; and No. 2, 140 feet deep. At 130 feet, they are connected by a level of 150, which is extended south beyond No. 2 for 25 feet. At this depth, there are two veins which form a junction at shaft No. 2. At the junction, the ore-body is from 18 inches to ten feet in width. The larger body averages at this time about $10 silver and 30 per cent lead. The other vein, as shown in shaft No. 1 and the 130 foot level, is about 17 inches in width, while the pay-streak is from 2 to 10 inches in width. In the smaller vein, the ore is likewise principally galena, which runs about $50 silver per ton and 45 or 50 per cent lead. The mine is well timbered, has good machinery, and about 1000 tons of ore on the dump.

DAVENPORT.—It appears that the question of a water supply has been solved by this company. An artesian well, sunk at nearly the highest point where placer gravel is found, struck an immense body of water at a depth of a little more than five hundred feet. The workmen are now piping or lining the well, and in a few days the water will be pumped upon the placer ground, when actual operations will be commenced.

GALISTED MINING AND REDUCTION COMPANY.—The company has a three years' lease, with the privilege to purchase, upon the Gold Hope mine. It has begun work with the view of thoroughly developing this property.

MARSHALL BONANZA.—Continuous development-work with the view to production will soon be commenced upon the property.

ST. LOUIS & NEW MEXICO.—It is reported that this company owns 800 acres of placer ground on Tuerto Gulch, two miles and a half below Golden. It has just received a car-load of machinery, and begun active work.

OHIO.

A dispatch to the New York *World* states that the tunnel for lubricating oil is about to be driven at Mecca, under the management of a company organized in New York, with Silas B. Dutcher as president. The oil is found in an area fifteen miles in length by five miles wide. It is estimated that 500,000 barrels have been taken out by pumping wells at an average of forty feet, which would represent, at its present value of $20 per barrel, $10,000,000. It has been demonstrated that a tunnel about six feet by three feet will pay to cut through a stratum of shale that forms the division between two layers of sandstone. The company has two square miles of territory in the heart of the best developed region, and should the yield be but one pint per running foot per day, it would pay 33⅓ per cent on the capital stock of $1,000,000. The tunnel will be four miles long.

UTAH.

BEAVER COUNTY.

It is understood, says the Salt Lake *Tribune*, that the Utah Central Railroad will extend a switch out six miles toward the mines from Milford, where the upward slope begins. The ore can be delivered at this point for 60 cents a ton. There is a strong desire among the large ore-producers in this region to see a second railroad penetrate the country, since every body is convinced that smelting at Sandy is much cheaper (40 per cent, it is said) than down here, the difference being mainly in cost of labor and fuel. If really fair rates for transportation of ores could be depended on, there would never be any more smelting in this southern country.

JUAB COUNTY.

MAMMOTH.—Reports state that a suit has been instituted against the company for the recovery of sums aggregating $50,000.

MILLARD COUNTY.

RED CLOUD.—This company has been organized with a capital stock of $1,000,000. The properties belonging to the company are the Chief of the West and Last Chance, in Antelope Mining District. Salt Lake City will be the chief place of business.

PI UTE COUNTY.

BULLION CAÑON COMPANY.—This mill, at Marysville, has been undergoing an overhauling, and has been placed in good condition for working ores. The mill is operated by water-power. The latest improvement was the addition of Frue vanners to make the concentration more perfect, and now the loss of metal is very small. A lot of ore from the Pluto mine has lately been milled, saving all the assay value except about $1 per ton. Since the improvements, the mill ran a few days, and produced a bar of bullion weighing 800 ounces, which was 931 fine in silver, and contained sixteen ounces of gold. This company also owns the Pluto mine. It expects to do custom work, and to operate all winter, both at the mill and mine.

CLYDE.—The mine is developing by a tunnel now in 932 feet, and driving to cut the vein at depth of 500 feet below the surface. To do this, the tunnel will have to run 150 feet farther.

SALT LAKE COUNTY.

A number of gentlemen interested in the mining industry of Utah have organized the Salt Lake Mining Institute, the purpose of which is to report upon the prospects of mining and of business in general; to develop mines; and to sell the properties at a reasonable price to capital that will make vigorous and extensive developments.

SUMMIT COUNTY.

EMPIRE.—It is stated that the claims of the employés of this company against the property have nearly all been bought in, and it is probable its affairs will all be settled soon.

ONTARIO.—The drain tunnel, says the Salt Lake *Tribune*, tapping the mine on the 600 level, at shaft No. 3, is 5763 feet long, from its mouth to the shaft; it is 5 feet by 7 in the clear, exclusive of lumber flume on the floor, 18 inches deep by three feet wide, in which the water is running nine inches deep like a mill-race, the grade being half an inch to the rod, or 13 4 feet per mile. This tunnel cost between $25 and $30 a foot. There are two compound 17-inch plunger steam-pumps on the 800 level, lifting 2700 gallons a minute to the tunnel, and another similar pump, 14-inch, on the 700 level. The cross-drift from shaft No. 2 on the 600 level is about 175 feet long to the vein. Thence this level is opened 850 feet east. Shaft No. 3 is farther from the vein, so that the cross-drift from it to the vein, which is really an extension southward of the drain tunnel, cuts the vein 426 feet south of the shaft, and 330 feet west of any other work on the vein. They drove the 600 level west from the No. 2 cross-drift as far as they could for the water, and then bore off northwest into the hanging country, and took the shortest cut to shaft No. 3. Through this, the water lifted from below runs to the drain tunnel, a distance of some 1400 feet. It is 1150 feet on the course of the vein from shaft No. 2 to shaft No. 3, or between the cross-drifts from the shafts. This, with the 850 feet east, makes the 600 level 2000 feet long from the east face to the cross-drift from shaft No. 3. At the latter point, the vein is 10 feet thick, with one foot of about 100-ounce ore on the hanging-wall, and 1½ feet on the foot-wall. Westward of this point, the company, or some of the principal owners in it, have a block of ground 3000 feet square, through which it is certain the Ontario vein continues, and which will be opened in due time, and contribute its share to the irrigating supply of Summit County, all of which above the drain tunnel will, of course, pass off without expense. All along the surface of this new ground, the vein has been traced; and although it seems to be for the most part pinched, yet it bears the characteristic ore that has made the Ontario output of $14,000,000 above the 600 level. The entire property, it will be seen, is about one mile long. The great shaft, No. 3, is now nearing the 800 level. From the 600 level down to that station, a double 20 inch pump column is to be put in, through which a double Cornish pump, worked by the enormous engine on the surface, will send up 3000 gallons of water per minute if necessary. The shaft will be sunk to the 1000-foot level; the double 20-inch column of the Cornish pump will be extended down there. Thus it is believed that the water trouble, which for a year or two has taxed the resources of the company, has been got under control, at least for two or three years.

WASHINGTON COUNTY—SILVER REEF.

STORMONT.—During August and September, the main incline was sunk 125 feet to the 6th level, most of the distance being in ore. Under date of October 2d, the superintendent reports: Progress in 6th level has been somewhat delayed by cutting station, now completed. The south drift has been advanced nine feet, and continues to show a very good vein of ore. The probabilities are, that there is a chute of pay-ore from the 5th level, but its extent can only be told as we push the level ahead.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Oct. 12.

The number of shares dealt in at the Mining Exchange foots up a large total, but the business done was confined to a few low-priced fancy stocks. Harlem, which was raided last week, was again very largely dealt in and its price was stronger; but it was simply manipulation. Eastern Oregon, Decatur, Sutro Tunnel, Robinson, and Amie are the other stocks which were very largely dealt in, and which, in fact, comprise the whole business done in the market. In every one of these stocks, the prices did not materially change, but were generally steady. We give a full summary of the market below. The total number of shares sold aggregates 193,710 shares, as against 183,363 last week.

The Comstock shares have been very quiet, at steady prices. California was irregular, selling from 11@18@16c., with a small business. Consolidated Virginia was quiet and steady, selling from 43@50@47c. Sierra Nevada was also steady, selling from $4@$4.25. Union Consolidated was very moderately dealt in at steady prices, selling from $4.05@$4. Mexican sold from $2.20@$2.25 under small transactions. Sutro Tunnel was active and steady at 18c.

The Leadville stocks were moderately dealt in at steady prices. Amie was quite active at steady prices; it sold from 13@12c. Chrysolite was fairly active at irregular prices; it sold from $1.20@$1.10. Dunkin, with a small business, sold at 25c Breece records a small business at 16@18c. Iron Silver was moderately dealt in at steady prices, selling from $2.95@$3. Leadville sold at 43c. Little Chief was steady, with a small business, selling from 53@60c. Little Pittsburg was quiet and steady at 63@65c. Climax sold from 11@12c., under a small business.

The Bodie stocks were very quiet, and were steady. Bodie Consolidated sold from 50@55c., with small transactions. Standard was quiet and steady at $5.75@$6. Bulwer was but moderately dealt in at steady prices, selling from 52@50c. North Standard was quiet and strong, selling from 10@25@20c.

The Tuscarora stocks were moderately dealt in at stronger prices. Grand Prize was fairly dealt in and was strong, selling from 25@59@55c. Belle Isle was quiet and steady at 30@33c. Navajo was at one time quite strong, but declined toward the close; it sold from $2.65@$3.50@$3 under a small business. North Belle Isle was quiet and steady at 45@50c. Elko Consolidated was quite weak, under a small business, selling from 7@2c.

In the miscellaneous list, Alice was a little weak, under a moderate business, declining from $2.85@$2.65. Horn-Silver was moderately dealt in at steady prices, selling from $7.25@$7. Hukill was quiet and steady at 5@7c. Northern Belle records a small business at very irregular prices; it sold from $5.63@$4.85@$5.50@$5. Robinson Consolidated was quite active and was irregular; it sold from 39@34@40@37c. Sierra Grande was moderately dealt in at steady prices, selling from $1@$1.05.

Barcelona was quiet and a little weak, selling from 32@28c. Central Arizona was steady at 21@25c. under a small business. Decatur was very actively dealt in at steady prices; it sold at 4c. throughout. Eastern Oregon was also very active, and was also steady; it sold from 40@48@47c. Harlem recovered from its weak prices of last week, and was stronger under a very active business; it sold from 76@87@86c. Sonora Consolidated was almost neglected, and was steady, selling from 25@24c.

The annual meeting of the stockholders of the Amie Consolidated Mining Company was held on Tuesday last at No. 40 Broadway, this city, at which there was a good attendance. There were 402,490 shares of stock represented out of a total of 500,000. The chief object of the meeting was the election of a board of directors for the ensuing year; and, as there was considerable opposition to the present management, it proved quite interesting. Mr. Thomas G. Roebuck, of Newark, led the opposing element; but he and his friends could muster but 169,410 proxies, while the management voted on 233,080, and thus succeeded in electing the following directors: A. W. Gill, Robert Sewell, L. V. De Forrest, L. D. Roundebush, George P. Sheldon, George H. Morrison, and J. S. Lockwood. The financial statement of the company for the year ended October 5th shows that the receipts were $53,828.53; disbursements (including a dividend of $25,000 and $414.40 lost by the failure of the Bank of Leadville), $44,864.69; cash on hand, $8963.64. The superintendent, who was at the meeting, stated that he had received a dispatch from the mine that No. 5 shaft was looking very well.

It is reported that the Ontario will soon resume dividends. It has probably accumulated fully $250,000 in its treasury after paying for the coal mines and railroad.

On the Green Mountain, the following is reported from a good source: The vein has been cut at about the calculated distance. Work is going forward on the vein at the rate of 200 feet or more a month, seven and a half feet a day, with power-drills. The vein is extremely well defined; the quartz is soft and friable, and breaks into small fragments. It contains some gold, but not enough as yet to pay. There are some 500 feet to run before the Blake chute will be reached. The mills on the hill are stopped, all the stamping now being done at the 60-stamp mill. The sixth level will be extended back along the vein as far as the supposed Gregg chute or beyond. This chute is so known from the fact that it was opened by Mr. Gregg, who is now the acting superintendent of the Homestake and adjoining claims in the Black Hills.

The new management of the Sierra Grande Mining Company, under the presidency of Professor Cope, in the announcement of dividend No. 7, presents the following approximate preliminary statement, pending a detailed financial report now in preparation:

Cash in bank and at mint	$130,500
Cash—in hands of general manager at Lake Valley; receivable from ore shipped to Pueblo during September; and from other sources, partly estimated	98,500
	$229,000
Deduct dividend No. 7, payable October 3d, 1883	100,000
Reserve of cash assets, receivable by October 31st	$129,000

The circular continues as follows:

"Reductions in the current expenses of about three thousand dollars per month have been recently inaugurated, and work which has proved unproductive has been stopped. A part of the resources of the past few months has been derived from the tailings of the hurried mill work of last winter. These are now exhausted, and we shall henceforth depend on the fresh product of the mines. The output of ore is indicated by our manager as satisfactory in high-grade ore, and he reports that there are no present indications of a decrease in quantity or quality. The low-grade ore is found in large quantities and is of value. There appears to be an economy in shipping high-grade ore to a smelter in Pueblo, and in working the low grades in our own mill. But this problem is not yet fully worked out. A diamond rock-drill has just been put into operation which will save much expense in sinking shafts for discovery of ore-beds. It is also proposed to purchase concentrators for utilizing the lowest grade of ores and tailings. It is expected that the railroad will be soon extended from Nutt station to Lake Valley."

The action of Ralph D. Perkins and other stockholders against Charles Dennis, J. Warren Brown, and others, and "the Dunderberg Mining Company," which was begun in the Supreme Court of the State, has been transferred to the United States Circuit Court. The corporation was organized in May, 1879, under the laws of the State of New York, with a capital stock of $1,500,000, divided into 150,000 shares of $10 each. It is alleged that soon after the organization the defendants entered into a pretended agreement with J. Warren Brown, the owner, in trust for himself and others, of certain mining claims and property situated in Clear Creek County, Colorado, to issue to him and his associates as full-paid stock 150,000 shares for the pretended consideration of the conveyance of the mining claims and property. It is alleged that the mining property was not worth $1,500,000 nor more than $242,000, which was the sum actually paid to the several owners of it. The plaintiff prays that the defendants may be ordered to account concerning the gains and profits received by each of them from the sale of said stock, and that the value of the property in question be determined by the court.

DIVIDENDS.

The Castle Creek Gold Mining Company, of Idaho, has declared a dividend (No. 17) of three per cent, payable October 16th.

The Copper Queen Mining Company, of Arizona, has declared a quarterly dividend of $125,000, payable October 16th.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 13) of two per cent, payable October 18th.

The Juniper Gold Mining Company, of Idaho, has declared a dividend (No. 1) of two per cent, payable October 20th.

The Mount Diablo Mining Company, of Nevada, has declared its third consecutive monthly dividend of twenty-five cents per share.

The Oro Grande Mining Company, of California, has declared a dividend (No. 3) of $16.000.

PIPE LINE CERTIFICATES.

Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

The market for the past week has been a declining one. Friday, October 5th, it opened at $1.13¾, sold down to $1.12⅝, closing dull at $1.13⅛. There was considerable covering of short accounts at about these figures, and the market was devoid of such strength as comes from short buying. Saturday, the market was stationary at about $1.13¼. Monday, the market exhibited weakness. The immediate cause of this weakness was the announcement that Howe No. 10 had come in over Sunday, and had made 150 barrels the first hour. It had declined by Monday morning, but the evidence was unmistakable that the Balltown production was increasing to an extent that alarmed the bulls and made a decline seem probable. Tuesday, the market dropped down to $1.10⅛, recovering at the close to $1.12 in anticipation of the Pipe Line report which was to appear the next day, and the agreement among prominent Balltown and Cooper tract producers to suspend the starting of any new wells until next spring. This bull feeling was very unsubstantial; but early Wednesday morning, the market rose to $1.13. It soon began to drop, however, and did not stop till it reached $1.09¼. Thursday, the market declined to $1.07⅞, rallying at the close to $1.09⅝. This (Friday) noon, the market, after having declined to $1.08⅝, rallied to $1.10¼, but there is nothing in the situation at the present moment to justify high prices for oil.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 6	$1.13¼	$1.13¾	$1.13	$1.13½	2,260,000
8	1.12⅝	1.12⅝	1.11⅝	1.11½	4,373,000
9	1.11¼	1.12¾	1.10½	1.12⅛	3,347,000
10	1.12	1.13	1.09¼	1.09⅝	5,243,000
11	1.09⅛	1.09⅝	1.07⅞	1.09½	4,200,000
12	1.09⅝	1.10¾	1.08⅝	1.10⅜	4,384,000
Total sales					23,813,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Oct. 5.	Oct. 6.	Oct. 8.	Oct. 9.	Oct. 10.	Oct. 11.
Albion	....	....	....	....	....	....
Alpha	2¼	....	....	....	....	....
Alta	1⅜	1⅜	1⅜	1¼	1¼	1⅛
Argenta	....	....	....	.05	.25	.30
Bechtel	....	....	....	....	....	....
Belcher	1¼	1¼	1¼	1¼	1¼	1⅛
Belle Isle	....	....	....	....	.30	.35
Best & Belcher	3⅛	3⅛	3¼	3¼	3¼	3⅜
Bodie	.50	.50	.55	.55	.55	.50
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.10	.15	.20	.15	.20	.20
Challar	2⅜	2¾	3	2⅞	3	3
Con. Virginia	.45	.45	.45	.45	.55	.50
Crown Point	1¼	1¼	....	....	1½	1⅜
Elko Cons	....	.10	.10	.10	10	....
Eureka Cons	6	6	5¾	5⅝	6	5¾
Exchequer	....	....	....	....	....	....
Gould & Curry	2¼	2¼	2⅜	2¼	2¼	2¼
Grand Prize	.30	.30	.40	.60	.60	.60
Hale & Norcross	3⅜	3⅜	4	3⅞	4	3⅝
Independence	....	....	....	....	....	....
Martin White	....	....	....	....	....	....
Mexican	2¼	2⅜	2¼	2¼	2¼	2¼
Mono	....	....	....	....	....	....
Mount Diablo	....	....	....	....	4¼	4
Navajo	....	2¾	3	3	3¼	3¼
Northern Belle	5	....	5	5	5	5⅛
North Belle Isle	....	....	....	....	....	....
Ophir	3⅝	3⅞	4¼	4¼	4½	4⅝
Overman	....	....	....	....	....	....
Potosi	1	1	1⅛	1¼	1⅛	1⅛
Savage	1⅛	1⅛	1⅛	1⅛	1⅛	1⅛
Scorpion	.55	.60	.65	.60	.60	....
Sierra Nevada	4⅛	4¼	4¼	4¼	4¼	4¼
Silver King	....	....	....	....	....	....
Tip Top	....	....	....	....	....	....
Union Cons	4	4¼	4	4	4	4
Utah	1⅞	2	2⅛	1⅞	2⅛	2
Wales Cons	....	....	....	....	....	....
Yellow Jacket	3¼	3¼	....	3¼	3¾	3¾

The following are the financial balances of the various mining companies on October 1st:

CASH ON HAND.

Alta	$28,109.43	Justice	$8,000.00
Andes	6,000.00	Jackson	4,289.46
*Argenta	766.32	Mono	2,729.00
Alpha Con	6,458.00	Northern Belle	43,771.90
Booker Con	403.38	Javajo	2,639.97
†Belcher	23,362.67	Occidental	5,809.01
Bulwer	411.65	Ophir	61,579.68
Bodie Con	32,323.09	Pedro Con	10.55
Benton Con	6,313.89	Potosi	35,991.58
‡Con. Virginia	84,693.76	Sierra Nevada	65,648.40
Challenge Con	5,575.13	Standard	161,509.00
Chollar	91,604.60	Savage	11,475.48
§California	857.35	Syndicate	4,977.82
Crown Point	21,170.54	Summit	1,046.15
Double Standard	36.20	Tioga Con	842.00
Exchequer	17,867.22	Utah	4,564.44
Genesee Valley	3,758.77	Union Con	17,422.77
Gould & Curry	18,778.17		

INDEBTEDNESS.

Best & Belcher	$7,119.02	Hale & Norcross	$14,536.75
Day (overdraft)	371.42	Lady Washingt'n	3,864.83
**Grand Prize (overdraft)	16,392.79	Martin White	2,012.99
		Mexican	21,499.67

Albion indebtedness, exact amount not yet known; approximate $260,000.

*Outstanding drafts $6382.75.
† Due Sutro Tunnel Company, $10,920.
‡ Monthly expense of mine, amount unknown.
§ Overdraft at bank, $7471.17.
‖ Bills payable, $91,151.81.
** Outstanding drafts, $3919.37.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, October 11.

There is no improvement to note this week in the market for mining stocks, which continues to rule dull, with prices inclined to a lower level. This is not because of any change in the price of ingot copper to warrant a decline, but is one simply of supply and demand. The orders to purchase stocks from *bona-fide* investors are few, and as there are two sellers to one buyer, some have to be left out in the cold or submit to lower prices in order to effect sales. As an instance, take Quincy, which last week was strong at $54 on good buying orders, this week has declined to $51, for no other reason that we can learn than an absence of orders to buy, there being no disposition to speculate in the stock. Calumet & Hecla has ruled steady and firm at $245. The usual quarterly dividend of $5 per share is announced. Franklin continues firm at the advance of last week, with sales at $12½@$12¾; while Pewabic, on the expectation of another assessment, has declined from $2½@$1½, and closed at $1¼ only bid for it. Osceola sold at $19@$19½. The rest of the list is entirely neglected.

In silver stocks, the market is duller than ever. With the exception of Silver Islet, there is really nothing doing. Silver Islet advanced from $3@$3½ on the strength of the strike alluded to last week; but he public generally do not take kindly to these reports, and are cautious about making investments in this class of mines, especially when assessments are the regular rule rather than the exception. Bonanza sold at $1¾, same as last week (100 shares only). Sullivan at 87½c., and at the Mining Board at 85c., seller 30. Bowman Silver, 12@13c. Harshaw, at 50c.

3 P.M.—The market this afternoon was without any special feature. Pewabic sold at $1¼. Silver Islet at $3. Quincy, $51@$50¾. Franklin, $12½ bid, $13 asked. Osceola, $19 bid, $21 asked. Atlantic, $10 bid. Pewabic. $1¼ bid, $1½ asked. Bonanza, $1½ bid, $1¾ asked.

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 12.

The market has been pretty steady the past week until to-day, when a decline of 1/16d. in London, and the equivalent of ⅛ per ounce in sterling exchange here, reduces our figures one quarter of a cent per ounce, as quoted in annexed table:

DATE.	London. Pence.	N. Y Cents.	DATE.	London. Pence.	N. Y. Cents.
Oct. 6	50 15-16	110¾	Oct. 10	50 15-16	110¾
8	50 15-16	110¾	11	50 15-16	110¾
9	50 15-16	110¾	12	50⅞	110½

The Assay of Japanese Coins.—Dr. Lawyer, the assay officer of the Mint Bureau, has just completed his test of the pyx coins sent from the Imperial Mint at Japan, and has made his report to the Director of the Mint. The results of the test correspond so closely with the results of that made at the Japanese Mint as to be thought remarkable.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of August.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	113,146	$681,587
*Alta-Montana, G. L. S.	"	———	$10,625
*Belmont	"	———	12,604
Bodie, G. S.	Cal	12,273	174,001
Bodie Tunnel, G.	"	———	52,742
*Bonanza King, G.	"	47,533	426,967
*Boston & Montana, G.	Mont	5,274	128,830
*Central Arizona, S.	Ariz	———	35,845
*Christy, S.	Utah	———	162,513
*Chrysolite, S. L.	Colo	21,379	284,308
*Consolidated Bobtail, G	Colo	4,898	47,986
*Contention, S.	Ariz	———	635,413
Crescent, G.	Cal	———	13,000
*Custer, G. S.	Idaho	———	43,572
*Deadwood-Terra, G.	Dak	42,163	283,680
*Derbec Blue Gravel, G. S.	Cal	16,212	88,482
Dunkin, S. L.	Colo	———	32,015
Evening Star, S. L.	Colo	———	47,061
*Father de Smet, G.	Dak	29,739	238,590
*Frisco M. and S. Co., G. S. L.	Utah	———	$77,084
Gunnell, S.	Colo	———	58,828
*Halle, G., S., C.	S. C.	3,872	27,900
*Head Center Consolidated	Ariz	4,250	32,618
*Head Center and Tranquillity	Ariz	8,910	89,108
*Hecla Consolidated, G. S.	Mont	———	293,922
*Homestake, G.	Dak	99,298	685,972
*Hope, S.	Mont	———	62,447
Horn-Silver, S. L.	Utah	324,200	2,171,200
*Howell S. and Mg. Co., G. S. L.	Ariz	38,452	90,520
Idaho, G.	Cal	———	150,642
*Independence, G. S.	Nev	———	32,991
Iron Silver, S. L.	Colo	———	751,062
*Jocuistita, S	Mex	———	‡258,959
*Kentuck, G. S.	Nev	1,454	16,886
*Lexington, S.	Mont	112,147	856,703
*Little Pittsburg, S. L.	Colo	12,414	54,505
*Marguerite, G.	Cal	3,034	65,594
*Martin White, G. S	Nev	———	136,317
Morning Star, S. D.	Colo	———	84,428
*Moulton, G. S.	Mont	———	123,288
Mount Diablo	Nev	67,333	329,433
*Navajo, G. S.	"	———	411,642
*North Belle Isle	"	———	2,153
Northern Belle, S.	"	27,947	474,987
*Ontario, S. L.	Utah	194,283	1,409,544
*Oxford, G.	N. S.	4,734	45,265
*Phœnix, G	N. C.	3,500	17,500
*Pinal Consolidated, S. L.	Ariz	———	181,485
*Plymouth Consolidated, G	Cal	79,105	227,218
*Satemo, G.	N. S.	———	2,500
*Silver Bow, G. S.	Mont	25,616	203,947
*Silver Cord, G. S. L.	Colo	———	703,333
Silver King, S.	Ariz	———	367,802
Standard, G.	Cal	40,943	779,344
Star, S.	Nev	———	27,095
*Stormont, S.	Utah	23,377	176,105
Syndicate, G.	Cal	7,957	46,385
Tintic M. and M. Co.	Utah	3,920	29,116
*Tip Top, S.	Ariz	———	37,868
*Tombstone, G. S. L.	"	51,574	548,764
Wyoming Consolidated	Cal	———	31,541
Yellow Jacket, S	Nev	———	265,885
Total amount of shipments to date			$15,839,687

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (———) indicates that no shipments have been made in the month named.

Cheap Nickel for Coinage.—Col. A. Loudon Snowden, Superintendent of the United States Mint at Philadelphia, received at noon, October 3d, bids for 20,000 pounds of metal to be used in minor coinage. Joseph Wharton was the only bidder, but his figure, ninety-one cents per pound, is the lowest at which the government has ever been able to get the metal.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended October 12th, as compiled from various sources, amounted to $296,000, as against $160,000, reported for the previous week. The receipts from January 1st, 1883, to date are $8,945,047.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended October 6th	$339,900
Corresponding week last year	58,200
Since January 1st, 1883	11,378,076
Corresponding period last year	44,301,795

Imports.

Week ended October 6th	$674,790
Corresponding week last year	261,517
Since January 1st, 1883	12,906,220
Corresponding period last year	3,368,985

Foreign Bank Statements.—The Governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £492,000 bullion, and the proportion of its reserve to its liabilities was reduced from 43 15-16 to 42¼ per cent, against 32½ per cent at this date last year.

The Coinage of Silver.—From an official statement made by Mr. Burchard, Director of the Mint, it appears that the silver on hand on July 1st, 1878, and purchased since then, is 123,447,480 ounces, of which 119,206,224 ounces have been used in the coinage of silver dollars and some subsidiary silver coin, 304,375 ounces have been wasted by the operative officers of the mints and sold in sweepings, leaving a balance on hand July 1st, 1883, of 3,936,880 ounces. This remainder has been weighed and verified by officers of the Treasury Department.

The profits on the coinage of this silver, including the repayments by the Adams Express Company, amount to $17,342,113, of which sum $15,581,713 have been deposited in the Treasury of the United States, $358,399 have been paid for shipping silver dollars, $51,925 for loss on sweepings sold, $71,429 for wastages, and $48 for loss on recoinage, leaving a balance in the coinage mints on June 30th, 1883, of $1,278,596, all of which has since that date been covered into the Treasury.

METALS.

NEW YORK, Friday Evening, Oct. 12.

Copper.—Sales for the week have been confined to a couple of hundred thousand pounds Lake Superior at 15¼c., which is the asking price at the close, 15⅛c. being bid. Other brands sell to a moderate extent at from 14⅝@14¾c. As the contracts for Lake copper with manufacturers expire this month, the question arises whether a new pool is to be made. It will be made if the manufacturers see any advantage in the conditions offered them; if not, they may as well fill their current wants at ruling prices from hand to mouth—and this seems to be the feeling. The Chili Bar speculation in London after all does not seem to work satisfactorily, good ordinary brands of Bars being down to £61 7s. 6d. (to-day's cable), and New Selected to £68.

Tin.—The large shipments from the Straits this way, and from Australia to London, combined with dullness in the metal trade both in Europe and here, have caused a downward tendency on both sides for the moment so far as large lines of Straits are concerned, while, in a jobbing way, prices are tolerably well sustained. Thus, we quote large lots on the spot 21c., and smaller parcels 21⅛@21¼c. London has meanwhile given way to £93 15s. with Straits Tin.

Lead.—Since our last report, some 600 tons of Common lead have been forced on the market and have gone at 4·20c., which is the closing figure on a firm market, Refined barely being worth 4·25c. The general tendency is a weak one just now, and will probably remain so unless a brisker demand for consumption should soon manifest itself, in which respect both September and so far October have been a disappointment. Chief consumers here are meanwhile still sufficiently stocked to be able to bide their time a couple of weeks longer, if need be. Much will depend, as regards prices in the near future, on the course the one or the other of the big holders out West may choose to adopt with what he has still on hand. London cables English Pig £12 7s. 6d.@£12 10s., steady.

From Chicago, Messrs. Everett & Post send the following dispatch:

Our market has declined slowly since our last report. The demand is only moderate, and there is but very little doing. Buyers are holding off, expecting a further decline, and are purchasing only for immediate wants. Sales for the week have been 800 tons Common and Refined at 4c.

Spelter.—The market for Common Domestic spelter is about as listless as it has been for months past, at 4½c., while Silesian is worth 5⅛c., nominally. Under date of the 28th ult., Messrs. H. R. Merton & Co., London, write:

A large business has been done at improving prices, £15 12s. 6d. for special, and £15 7s. 6d. for ordinary brands having been paid. Makers abroad will only sell moderately, as they believe in higher prices.

There is also a large demand for sheet-zinc, prices

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Oct. 12.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	2.80	....	2.75	....	2.85	....	2.85	....	2.85	2.75	2.75	2.65	1,600
Amie Con., Co.	.13	.12	.13	.12	.13	....	.13	....	.13	....	.12	....	18,100
Argenta, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bar. & Walker, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bassick, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Belle Isle, Ne.	....	....	....	....	.30	....	.33	....	....	....	....	....	300
Bodie Cons., Ca.	.50	....	....	....	....	....	....	....	.55	....	....	....	250
Breece, Co.	.16	....	.16	....	....	....	.18	....	....	....	....	....	775
Bulwer, Ca.	.52	.50	....	....	....	....	....	....	....	....	....	....	400
California, Ne.	....	....	.11	....	.18	.15	....	....	.18	.16	.16	....	5,800
Cal. & Hecla, Mich.	....	....	....	....	....	....	....	....	....	....	....	....	....
Carbonate Hill	....	....	....	....	....	....	....	....	....	....	....	....	....
Caribou Con., Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite, Co.	1.20	....	1.20	....	....	....	....	....	....	....	1.20	1.10	4,000
Cons. Va. Ne.	....	....	.43	....	.43	....	.46	....	.50	....	.47	....	5,250
Crown Point	....	....	....	....	....	....	....	....	....	....	....	....	....
Deadwood-Terra, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin, Co.	.25	....	....	....	....	....	.25	....	.25	....	....	....	1,700
Eureka Cons., Ne.	....	....	....	....	....	....	5.75	....	....	....	....	....	100
Excelsior, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Father de Smet, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Findley, Ga.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Stripe, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gould & Curry, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Prize, Ne.	.26	.25	....	....	.41	.36	.59	.54	.54	.53	.55	....	3,800
Great Eastern, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Green Mountain, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hale & Norcross, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hall-Anderson, N. S.	1.15	....	....	....	....	....	....	....	....	....	....	....	100
Hibernia, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Homestake, Dk.	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn-Silver, Ut.	7.25	7.00	7.00	....	7.00	....	7.00	....	....	....	7.00	....	1,220
Hukill, Co.	.07	....	.06	....	.06	....	....	....	....	....	.07	....	1,550
Independence, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Iron Silver, Co.	3.00	2.95	3.00	....	3.00	....	....	....	....	....	3.00	....	4,700
La Plata, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Leadville C., Co.	....	....	.43	....	....	....	....	....	....	....	....	....	100
Little Chief, Co.	.58	.55	.55	....	.53	....	....	....	.58	.57	.60	....	2,900
Little Pittsburg, Co.	....	....	....	....	.65	.63	....	....	.65	....	.65	....	600
Martin White, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Moose, Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Navajo, Ne.	2.65	....	....	....	3.50	3.25	3.00	....	3.00	....	....	....	1,300
Northern Belle, Ne.	....	....	5.63	....	4.90	4.85	5.50	....	....	....	5.00	....	620
North Belle Isle, Ne.	.48	.45	.45	....	....	....	.45	....	.50	.47	.50	....	1,750
Ontario, Ut.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ophir, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	775
Plumas, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Prussian, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	....
Quicksilver Pref., Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., Ca.	....	....	....	....	....	....	....	....	....	....	6.50	....	100
Rising Sun, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson Cons., Co.	.39	....	.39	.34	.38	.35	.40	.37	....	....	....	....	12,400
Saint Joseph's Lead.	....	....	....	....	....	....	....	....	....	....	....	....	....
Savage, Ne.	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Grande, N. M.	....	....	....	....	1.05	1.00	1.05	....	....	....	1.05	....	4,000
Sierra Nevada, Ne.	....	....	....	....	....	....	4.00	....	4.25	....	....	....	310
Silver King, Ar.	....	....	....	....	....	....	....	....	8.25	....	....	....	30
Spring Valley, Ca.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard, Ca.	6.00	....	5.75	....	....	....	6.00	....	....	....	....	....	185
Stormont, Ut.	....	....	....	....	....	....	....	....	....	....	.25	.24	200
Tip Top, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina, Ar.	....	....	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Oct. 12.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	....	....	....	....	....	....	....	....	....	....	....	....	....
Alta	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Flag, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Barcelona, g.	....	....	.32	....	.32	.30	....	....	.30	....	.30	.28	1,100
Bear Creek	....	....	....	....	....	....	....	....	....	....	....	....	....
Bechtel Con., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Belvidere	....	....	....	....	....	....	....	....	....	....	....	....	....
Best & B'licher, g. s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Big Pittsburg, s. l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradshaw, s.	....	....	.23	....	....	....	....	....	.23	....	....	....	2,400
Buckeye	....	....	....	....	....	....	....	....	....	....	....	....	....
" pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bull-Domingo, s. l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bye and Bye	....	....	....	....	....	....	....	....	....	....	....	....	....
Calaveras, g	....	....	....	....	....	....	....	....	....	....	....	....	....
C'lav'r's W. & M. Co.	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal., B. H., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Central Ariz'na, s.	....	....	....	....	.25	.21	....	....	....	....	.25	....	300
Cherokee, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Chollar	....	....	....	....	....	....	....	....	....	....	....	....	....
Climax, Co.	....	....	.12	.11	.12	....	....	....	....	....	....	....	1,850
Cons. Imp'ri'l, g. s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Crowell, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dahlonega, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Decatur	.04	....	.04	....	.04	....	.04	....	.04	....	.04	....	21,800
Dunderberg	....	....	....	....	....	....	....	....	....	....	....	....	....
Durango, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Eastern Oregon	.47	.40	.47	.46	.47	.46	.47	.46	.48	....	.47	....	18,800
Elko Cons.	....	....	.07	.05	.03	....	.03	....	.03	.02	.02	....	1,600
Enterprise	....	....	....	....	....	....	....	....	....	....	....	....	....
Fannie Barret	....	....	....	....	....	....	....	....	....	....	....	....	....
Globe Copper	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Placer, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Goodshaw, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Granville, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hariem M. & M. Co.	.78	.76	.81	.77	.83	.79	.85	.83	.85	.84	.87	.85	31,600
Hortense, s	....	....	....	....	....	....	....	....	....	....	....	....	....
Imperial	....	....	....	....	....	....	....	....	....	....	....	....	....
Lacrosse, g	....	....	....	....	....	....	....	....	....	....	....	....	....
Lucerne	....	....	....	....	....	....	....	....	....	....	....	....	....
Mariposa Pref., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
" Com., g.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, g. s.	....	....	....	....	....	....	....	....	2.25	2.20	....	....	160
Miner Boy	....	....	....	....	....	....	....	....	....	....	....	....	....
Mono	....	....	....	....	....	....	....	....	....	....	....	....	....
North Standard, g.	....	....	.10	....	....	....	....	....	....	....	.25	.20	1,800
N. Horn-Silv'r, s. l.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ori'nt'l & Miller, s.	.08	....	.08	....	....	....	....	....	....	....	.09	.08	1,400
Parnell	....	....	....	....	....	....	....	....	....	....	....	....	....
Quartz Creek	....	....	....	....	....	....	....	....	....	....	....	....	....
Rappahannock, g.	.07	....	....	....	.07	....	.07	....	....	....	.08	.07	6,100
Red Elephant, s.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ruby, of Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cliff, s.	....	....	....	....	....	....	....	....	.10	....	....	....	500
Sonora Con.	.25	....	.25	....	....	....	.24	....	.24	....	.24	....	2,900
South Bodie, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Bulwer, g.	....	....	....	....	....	....	....	....	....	....	....	....	....
South Hite	....	....	....	....	....	....	....	....	....	....	....	....	....
South Pacific	....	....	....	....	....	....	....	....	....	....	....	....	....
State Line, 1 & 4, s.	....	....	....	....	....	.03	....	....	....	....	....	....	500
" Nos. 2 & 3, s.	....	....	....	....	....	....	....	.06	....	....	.05	....	2,000
Sutro Tunnel	18	....	.18	....	.18	....	....	....	.18	....	....	....	18,100
Taylor Plumas	....	....	....	....	....	....	....	....	....	....	....	....	....
Tioga	....	....	....	....	....	....	....	....	....	....	....	....	....
Unadilla, s.	....	....	.02	....	....	....	....	....	....	....	....	....	3,000
Union Cons., g. s.	....	....	....	....	....	....	....	4.05	....	4.00	....	....	160

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 78,140. Non-dividend shares sold, 115,570.

BOSTON MINING STOCKS.

	Oct. 5.		Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alloues	....	....	....	....	....	....	....	....	....	....	....	....	....
Amie	.15	....	....	....	.15	....	....	....	....	....	....	....	700
Atlantic	....	....	....	....	....	....	....	....	....	....	....	....	....
Aztec	....	....	....	....	....	....	....	....	....	....	....	....	....
Bodie Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bonanza D.	1.75	....	1.75	....	....	....	....	....	....	....	....	....	300
Bowman Sil	.13	.12	.13	....	.13	.12	....	....	....	....	....	....	5,000
Bruns. Ant.	....	....	....	....	....	....	....	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....	....	....	....	....	....	....	....
California	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Hec.	245	....	245	....	....	....	245½	....	245	....	....	....	61
Catalpa	.30	....	.35	....	.35	....	....	....	....	....	....	....	300
Central Ariz	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherryfield	....	....	....	....	....	....	....	....	....	....	....	....	....
Co. Virginia	....	....	....	....	.42	....	....	....	....	....	....	....	200
Copper F'lls	....	....	....	....	....	....	....	....	....	....	....	....	....
Copperop	....	....	....	....	....	....	....	....	....	....	....	....	....
Crescent	....	....	....	....	....	....	....	....	....	....	....	....	....
"Cusi"	....	....	1.70	....	....	....	....	....	....	....	....	....	100
Decatur	....	....	....	....	....	....	....	....	....	....	....	....	....
Deer Isle	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	....	....	....	....	....	....	....	....	....	....	....
Douglas	....	....	....	....	....	....	....	....	....	....	....	....	....
Duncan	....	....	....	....	....	....	....	....	....	....	....	....	....
Dunkin	.23	....	....	....	....	....	....	....	....	....	....	....	200
Empire	.19	....	....	....	.18	....	....	....	....	....	....	....	800
Eureka Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Franklin	12.75	....	12.50	....	12.75	12.50	....	....	12.75	....	....	....	400
Hancock G.	....	....	....	....	....	....	....	....	....	....	....	....	100
Harshaw	.50	....	....	....	....	....	....	....	....	....	....	....	....
Huron	....	....	....	....	....	....	....	....	....	....	....	....	....
Independ'ce	....	....	....	....	....	....	....	....	....	....	....	....	....
Indian Q'n.	....	....	....	....	....	....	....	....	....	....	....	....	....
Mammoth	....	....	....	....	....	....	....	....	....	....	....	....	....
Mass. & N. M.	....	....	....	....	....	....	....	....	....	....	....	....	....
Milton	....	....	....	....	....	....	....	....	....	....	....	....	....
Napa	....	....	2.75	....	....	....	....	....	....	....	....	....	100
National	....	....	....	....	....	....	....	....	....	....	....	....	....
North. Belle	....	....	....	....	....	....	....	....	....	....	....	....	....
Ontario	....	....	....	....	....	....	....	....	....	....	....	....	....
Osceola	19.00	....	19.00	....	19.00	....	19.50	....	....	....	19.00	....	32
Penn-Breck	....	....	....	....	....	....	....	....	....	....	....	....	....
Pewabic	....	....	2.00	1.75	1.75	....	....	....	1.63	1.50	1.50	1.25	1,105
Pine Tree	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth	.11	....	....	....	....	....	....	....	....	....	....	....	100
Quincy	....	....	52.00	....	52.00	51.50	....	....	52.50	51.00	51.00	50.75	183
Ridge	....	....	....	....	....	....	....	....	....	....	....	....	....
Robinson	.36	....	.38	....	....	....	....	....	....	....	....	....	200
San Pedro	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierre Nev.	....	....	4.00	....	....	....	....	....	....	....	....	....	50
S'ra Grande	1.00	....	....	....	....	....	....	....	....	....	....	....	100
Silver Islet	2.50	....	3.00	....	3.50	....	3.50	....	....	....	3.00	....	500
Silver King	....	....	....	....	....	....	....	....	....	....	....	....	....
Simpson Gd	....	....	....	....	....	....	....	....	....	....	....	....	....
South Paci.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard	....	....	....	....	....	....	....	....	....	....	....	....	....
Sullivan	.90	....	....	....	.92	.86	.87½	....	....	....	....	....	700
Sutro Tun.	.18	....	.18	....	....	....	....	....	....	....	....	....	500
Sycamore	....	....	....	....	....	....	....	....	....	....	....	....	....
Twin Lead.	....	....	....	....	....	....	....	....	....	....	....	....	....
Vizina	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	....	....	....	....	.25	....	....	....	....	....	....	....	100
....	....	....	....	....	....	....	....	....	....	....	....	....	....

PHILADELPHIA MINING STOCKS.

	Oct. 5.		Oct. 6.		Oct. 8.		Oct. 9.		Oct. 10.		Oct. 11.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.	....	....	....	....	....	....	....	....	....	....	....	....	....
Argent	.16	....	.16	....	.16	....	.17	.16	.18	....	.17	....	31,300
Arizona So.	....	....	....	....	....	....	....	....	....	....	....	....	....
Battle Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
Buena	....	....	....	....	....	....	....	....	....	....	....	....	....
California	....	....	....	....	....	....	....	....	....	....	....	....	....
Calista	....	....	....	....	....	....	....	....	....	....	....	....	....
Chrysolite	....	....	....	....	....	....	....	....	....	....	....	....	....
Cincinnati	....	....	.09	....	....	....	.09	....	.10	....	....	....	4,100
Comprom'e.	.12	....	....	....	.13	....	.12	....	.13	....	.13	....	3,500
Contention	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Virg.	....	....	....	....	....	....	....	....	....	....	....	....	....
Dauntless	.02	....	.02	....	....	....	.02	....	....	....	....	....	6,600
Del Monte	....	....	....	....	....	....	....	....	....	....	....	....	....
Denver City	....	....	....	....	....	....	.11	....	....	....	....	....	1,000
Eureka	....	....	....	....	....	....	....	....	....	....	....	....	....
Girard	....	....	....	....	....	....	....	....	....	....	....	....	....
Governor	....	....	.06	....	.06	....	.06	....	.06	....	.06	....	7,600
Grand Uni'n	.03	....	.03	....	.03	....	.03	.02	.03	....	....	....	12,500
Green Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
Gunnison	....	....	.15	....	....	....	.15	....	....	....	.17	....	900
Homestake	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver	....	....	....	....	....	....	....	....	....	....	....	....	....
Iowa Gulch	.04	....	.04	.03	.04	....	.04	....	.04	....	.04	....	28,500
Iron Silver	....	....	....	....	....	....	....	....	....	....	....	....	....
King Bul'on	....	....	....	....	....	....	....	....	....	....	....	....	....
Ledger Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Dia'd.	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Mam'd	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Pitts.	....	....	....	....	....	....	....	....	....	....	....	....	....
L'g & D'y H	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....
Mt. Sheridan	.04	....	....	....	....	....	....	....	....	....	....	....	800
Navajo	....	....	....	....	....	....	....	....	....	....	....	....	....
North'n B'l	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion	....	....	....	....	....	....	....	....	....	....	....	....	....
Orion Pref.	....	....	....	....	....	....	....	....	....	....	....	....	....
Palmetto E.	....	....	....	....	....	....	....	....	....	....	....	....	....
Pembina	....	....	....	....	....	....	....	....	....	....	....	....	....
Penn-Breck	.11	....	.10	....	.10	....	.11	....	.10	....	....	....	13,100
Permanent	....	....	....	....	....	....	....	....	.02	....	....	....	2,000
Pizarro	....	....	....	....	....	....	....	....	....	....	....	....	....
Pizarro Ex.	....	....	....	....	.01	....	....	....	....	....	....	....	3,200
Potosi	....	....	....	....	....	....	....	....	....	....	....	....	....
Rara Avis	....	....	....	....	....	....	....	....	....	....	....	....	....
Rara Avis E.	.09	....	.09	....	.09	....	.09	....	.09	....	.09	....	19,900
Record	....	....	....	....	....	....	....	....	....	....	....	....	....
Rico Pion'r	....	....	....	....	....	....	....	....	....	....	....	....	....
Sierra Apac.	.30	.25	....	....	....	....	....	....	.27½	....	....	....	2,650
Sierra Be la.	.67½	.65	....	....	.70	....	....	....	.70	.67½	....	....	4,250
Sierra G'nde	1.15	1.10	1.12½	....	1.12½	....	1.10	1.07½	1.10	1.07½	1.07½	....	9,800
Sierra Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Cord	1.60	....	....	....	1.60	....	....	....	....	....	....	....	4,300
Silver King	....	....	....	....	....	....	....	....	....	....	....	....	....
Silv'r Plume	....	....	....	....	....	....	....	....	....	....	....	....	....
Sonora Con.	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard	....	....	....	....	....	....	....	....	....	....	....	....	....
Sultana	....	....	....	....	....	....	....	....	....	....	....	....	....
Sutro Tun'l	....	....	....	....	....	....	....	....	....	....	....	....	....
Tombstone	.80	....	.65	....	....	....	....	....	.86	.75	.85	....	430
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....
Yale Mt.	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....

of which are also moving upward. At the fortnightly sheet-zinc sale, 50 tons were sold at £18, which is an advance on the last sale price.

Cable advices state that the market continues steady at the improvement.

Antimony has been quite dull at 9⅛c. Hallett's, and 10¼c. Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 12.

American Pig.—The Metal Exchange has the following returns from ninety-five furnaces up to October 1st:

Grade.	Stocks.		Production.	
	Sept. 1.	Oct 1.	Sept.	Oct.
No. 1.....	18,617	16,663	10,011	10,398
No. 2.....	14,102	12,585	4,887	5,951
Bess., Forge, and lower grades.....	51,535	48,194	31,800	33,749
Grade not specified	32,170	31,013	14,919	14.915
Total.....	116,424	108,473	61,617	65,013

There is nothing new to report in this trade. Business remains in the same apathetic state that it has been for some time past, and while a fair consumption is going on, there are but very few buyers in the market. Some of the furnace companies threaten to cease production, and already there are some furnaces blowing out along the Lehigh, Schuylkill, and Susquehanna rivers. This would be a wise action at this time, and would help the market considerably, as prices would thus be forced to a higher figure than at present. We quote No. 1 Foundry at $21@$22; No. 2 at $19@$20; and Gray Forge at $19.

At the Exchange, the following transactions were recorded:

Saturday, 1600 tons of pig. Monday, 100 tons, No. 1, January, $20.50. Tuesday, 100 tons, No. 1, May, $21.

Scotch Pig.—This trade is very quiet. Nothing new has been done that we hear of. Imports are gradually diminishing, and prices abroad remain very firm, owing to labor troubles and cost of coal.

We quote ex ship and to arrive: Coltness, $23.25; Langloan, $23.25; Summerlee, $22.75@$23; Eglinton, $21; Glengarnock, $22@$22.50; Dallmellington, $21.

At the Exchange the following cable quotations were received to-day: Coltness, 57s. 6d.; Langloan, 57s.; Summerlee, 56s.; Gartsherrie, 54s. 6d.; Glengarnock, at Ardrossan, 54s.; and Eglinton, at Ardrossan, 48s. Warrants at the Exchange to-day were 46s. 8d.

Rails.—There has been a little better demand for steel rails, and we hear of orders for some 20,000 tons at Pennsylvania mills at $37, for delivery in 1884. Prices, however, remain unchanged, and we quote, as last week, $37@$37.50, at mill.

Old Rails.—Nothing is doing in this trade. Old rails are scarce, and some spot lots are held firmly. We quote $22.50@$23 for Ts.

Scrap.—Scrap continues dull at $23.75 ex ship.

Philadelphia. October 11.

The pig-iron market has not recovered in any respect from the unfavorable condition in which it was reported last week. The consumptive requirements seem to have fallen off, but actual consumption has not. Stocks in makers' yards are lighter than usual, and a number of large consumers have about reached the end of their summer contracts. Were it not for the present fluctuations in prices, large contracts would be placed at once by these parties; but they have concluded to wait until prices have reached bottom limits, or until conditions are more favorable. The usual quotations are $21@$22 for No. 1 Foundry, though a number of small sales have been heard of at $20@$20.50 for what is called No. 1. No. 2 continues in greater abundance than No. 1, and ranges in price from $19@$20, with average sales at or near $19. A few brokers have been endeavoring to close out large lots at furnace banks. A few large sales have been made, but the bulk of business is trifling. Gray Forge has not weakened, except in the case of a few inferior irons, which were placed at $17 at furnace.

Foreign Irons.—Nominal quotations given for Bessemer, $20.50@$21. Brokers, who had inquiries for large blocks some time ago, are seeking buyers at the former figure; but no large transactions, and but few small ones, have been heard of. It is expected that Bessemer will decline, although no reason has been given for this belief.

Blooms.—At the bloomaries, there is a fair degree of activity, and orders run a month ahead for charcoal and anthracite at old quotations. Unusual concessions have been heard of in both qualities; but it is uncertain whether the figures at which business was done will be permanent.

Muck Bars.—One or two sales have been heard of at $35, and some inferior irons have sold as low as $33. Standard are firm at $34 for small lots; in large lots, these figures are shaded.

Manufactured Iron.—It is said to-day that some manufacturers will reduce to single turn unless demand should improve. The feeling in the finished iron trade is far from satisfactory. The depression is greater than at any former time. At the best prices obtained, there is very little in iron; and with the fluctuating demand and weak prices, the outlook is very discouraging. Quotations are nominally 2·15c., but business, especially in the country mills, is done away below this figure. Some few transactions in common iron have been closed at 1·80c. Good makes of common are held at 1·90@2c.

Plate and Tank Iron.—The situation in plate and tank iron is more satisfactory in consequence of the heavy demand and the large orders in hand for delivery during October and November. A decline is looked for on account of the weakness in the other departments. Some requirements are held back in view of this fact. Quotations are 2·50c. for Plate, with Shell and Flange 3c. and 4c., in large lots. Locomotive requirements are fair; but lots are bought for pressing requirements only, and works are carrying but little stock.

Structural Iron.—No heavy transactions can be reported, although there are specifications in hand which will probably be placed this or next week. Prices are unchanged.

Steel Rails.—Steel rails are quoted at $37@$37.50; but the impression prevails that the offers of large buyers will yet be accepted, though no actual business has been closed.

Old Rails.—There are a number of inquiries in hand, some of which have been floating around for several weeks. Bridge rails are offered at $24.50; Double Heads, $26; Tees, $23.25. Material could be sold at about 50 cents below these quotations. Buyers of small lots will give 25 cents less than holders ask.

Nails.—Nails have dropped to $2.85, in consequence of the offerings of the Danville and other new mills. Trade price, $2.90. Jobbing price, $3.

Scrap.—A fair amount of scrap was carted out of yards this week at $25 for best, and from that down to $20 for inferior.

Pittsburg. October 11.

There are no signs of improvement in the Western Pennsylvania iron trade, notwithstanding the efforts of outside parties to unload stocks at concessions from rates heretofore asked. Among sales reported are 250 tons of Gray Forge at $18; 1500 tons of Bessemer at $20.50; sales of Foundry at $18.50@$19. Muck Bars are selling at $33. Manufactured iron, 1·80c. Nails, $2.70. Wrought Pipe, 75 per cent off list. Tubes, 60 per cent off. Inquiries for Old Rails are in hand at $24.50@$25 asked. Winter deliveries of Steel Rails, $37. Merchant Steel, 11@12c. for Refined Cast; Crucible machinery, 6@7c. Crop Ends, $23.50@$24.

Graff, Bennett & Co.'s mills at Millvale have been shut down for want of gas. Bridge and locomotive-works are crowded with orders.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 12.

Anthracite.

The situation has not materially changed from last week, and there is absolutely nothing new to report. The trade is demoralized, and can not recover until there is the most decisive evidence of co-operation among the companies. As they now stand, the Delaware & Hudson, the Lehigh Valley, and the Lehigh & Wilkes-Barre probably unite in recommending an early stoppage. The roads will be simply blocked, if the present state of affairs continues for a week. The Delaware, Lackawanna & Western, it is presumed, is indifferent, while the Philadelphia & Reading and the Pennsylvania Coal Company want to continue full-time, the latter because in about thirty days stocking for its upper river trade will cease, so that it is now exceptionally busy.

President Gowen, of the Reading Road, was in this city last Tuesday, but no consultation of the head officials was held; and no agreement was entered into.

A telegram from Philadelphia states that the Girard estate has leased its mines in Schuylkill and Columbus counties, Pa., to the Philadelphia & Reading Coal and Iron Company, the Lehigh Valley Coal Company, the Thomas Coal Company, the William Penn Coal Company, and Myers, McCreery & Co., for fifteen years from January 1st, 1884, on a royalty of forty cents per ton the first year, and increasing annually one cent per ton during the continuance of the leases. The collieries were previously leased for fifteen years to the same tenant at 25 cents per ton and 1 cent additional each year, the rate being 39 cents for this year. These collieries produced last year 1,500,000 tons of coal.

Bituminous.

The bituminous trade continues very dull, and there are but few small orders reported. Vessels, which were driven in larger numbers into Boston harbor by the late storm, have been generally distributed to their different shipping points, and are consequently in better supply than of late. Low prices still prevail.

Horsford's Acid Phosphate

A Good Thing.

Dr. ADAM MILLER, Chicago, Ill., says: "I have recommended Horsford's Acid Phosphate to my patients, and have received very favorable reports. It is one of the very few really valuable preparations now offered to the afflicted. In a practice of thirty-five years I have found a few good things, and this is one of them."

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10·5 miles. Size, 31×40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53×41 inches. Printed in colors. Pocket form, $5.

MAP OF MINING CLAIMS ADJOINING LEADVILLE, California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, $2.50. In cloth-bound covers, $2.

MINING MAP OF UTAH.—Showing the location of the Mining Districts, over an extent of territory 150 miles from North to South. Compiled from U. S. Government Surveys and other authentic sources. Scale, one inch to four miles. Colored. 1879. Pocket form. $1.50.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1878. $3.50.

POCKET MINING ATLAS OF THE MINES OF THE UNITED STATES.—Showing the Mines of NEVADA: the Comstock Lode, the Eureka, Treasure Hill, and Tuscarora Districts; CALIFORNIA, including Map of the Bodie District; COLORADO, including the Leadville, Silver Cliff, San Juan, Caribou, and Central City Districts; DAKOTA, including Map of Deadwood; MONTANA, IDAHO, UTAH, ARIZONA, NEW MEXICO, LAKE SUPERIOR REGION, the SOUTHERN STATES. 1880. Printed in colors, and bound in flexible leather covers. Price, $1.

THE SCIENTIFIC PUBLISHING CO.

27 Park Place, New York

P.O. Box 1833.